

THE HOME OF
THE BLIZZARD



SIR DOUGLAS MAWSON

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To William
with best wishes

From Henry

Christmas, 1915.

**THE HOME OF THE
BLIZZARD**



SIR DOUGLAS MAWSON

THE HOME OF THE BLIZZARD

BEING THE STORY OF THE AUSTRALASIAN
ANTARCTIC EXPEDITION, 1911-1914 ;

BY SIR DOUGLAS MAWSON, D.Sc., B.E.

ILLUSTRATED IN COLOUR AND BLACK AND WHITE ALSO
WITH MAPS

VOL. I

ERRATA

VOL. I

P. 93. The reference to Rock in text map *should be hatched and not left blank.*

P. 158 (illustration facing). For "Moon" *read* "Noon."

VOL. II

P. 331, column 1, last line. *Delete* "the Hon."

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TO THOSE WHO MADE IT POSSIBLE
THE SUBSCRIBERS AND CO-OPERATORS
TO THOSE WHO MADE IT A SUCCESS
MY COMRADES
AND TO
THOSE WHO WAITED

AUTHOR'S PREFACE

THE object of this book is to present a connected narrative of the Expedition from a popular and general point of view. The field of work is a very extensive one, and I feel that this account provides a record inadequate to our endeavours. However, I am comforted by the fact that the lasting reputation of the Expedition is founded upon the scientific volumes which will appear in due course.

Allusion to the history of Antarctic exploration has been reduced to a minimum, as the subject has been ably dealt with by previous writers. This, and several other aspects of our subject, have been relegated to special appendices in order to make the story more readable and self-contained.

A glossary of technicalities is introduced for readers not familiar with the terms. In the same place is given a list of animals referred to from time to time. There, the common name is placed against the scientific name, so rendering it unnecessary to repeat the latter in the text.

The reports handed to me by the leaders concerning the work of sledging journeys and of the respective bases were in the main clearly and popularly written. Still it was necessary to make extensive excisions so as to preserve a "balance" of justice in all the accounts, and to keep the narrative within limits. I wish to assure the various authors of my appreciation of their contributions.

Mr. Frank Hurley's artistic taste is apparent in the numerous photographs. We who knew the circumstances can warmly testify to his perseverance under conditions of exceptional difficulty. Mr. A. J. Hodgeman is responsible

AUTHOR'S PREFACE

for the cartographical work, which occupied his time for many months. Other members of the Expedition have added treasures to our collection of illustrations; each of which is acknowledged in its place.

To Dr. A. L. McLean, who assisted me in writing and editing the book, I am very greatly indebted. To him the book owes any literary style which it may possess. Dr. McLean's journalistic talent was discovered by me when he occupied the post of Editor of the *Adelie Blizzard*, a monthly volume which helped to relieve the monotony of our second year in Adelie Land. For five months he was constantly at work, revising, cutting down or amplifying the material of the story.

Finally, I wish to express my thanks to Dr. Hugh Robert Mill for hints and criticisms by which we have profited.

DOUGLAS MAWSON

LONDON, *Autumn* 1914.

FOREWORD

Nor on thee yet
Shall burst the future, as successive zones
Of several wonder open on some spirit
Flying secure and glad from heaven to heaven.

BROWNING

THE aim of geographical exploration has, in these days, interfused with the passion for truth. If now the ultimate bounds of knowledge have broadened to the infinite, the spirit of the man of science has quickened to a deeper fervour. Amid the finished ingenuities of the laboratory he has knitted a spiritual *entente* with the moral philosopher, viewing :

The narrow creeds of right and wrong, which fade
Before the unmeasured thirst for good.

Science and exploration have never been at variance ; rather, the desire for the pure elements of natural revelation lay at the source of that unquenchable power—the “love of adventure.”

Of whatever nationality the explorer was always emboldened by that impulse, and, if there ever be a future of decadence, it will live again in his ungovernable heritage.

Eric the Red ; Francis Drake—the same ardour was kindled at the heart of either. It is a far cry from the latter, a born marauder, to the modern scientific explorer. Still Drake was a hero of many parts, and though a religious bigot in present acceptation, was one of the enlightened of his age. A man who moved an equal in a court of Elizabethan manners was not untouched by the glorious ideals of the Renaissance.

FOREWORD

Yet it was the unswerving will of a Columbus, a Vasco da Gama or a Magellan which created the devotion to geographical discovery, *per se*, and made practicable the concept of a spherical earth. The world was opened in imaginative entirety, and it now remained for the geographer to fill in the details brought home by the navigator.

It was long before Thule the wondrous ice-land of the North yielded her first secrets, and longer ere the Terra Australis of Finné was laid bare to the prying eyes of Science.

Early Arctic navigation opened the bounds of the unknown in a haphazard and fortuitous fashion. Sealers and whalers in the hope of rich booty ventured far afield, and, ranging among the mysterious floes or riding out fierce gales off an ice-girt coast, brought back strange tales to a curious world. Crudely embellished, contradictory, yet alluring they were; but the demand for truth came surely to the rescue. Thus, it was often the whaler who forsook his trade to explore for mere exploration's sake. Baffin was one of those who opened the gates to the North.

Then, too, the commercial spirit of the generations who sought a North West Passage was responsible for the incursions of many adventurers into the new world of the ice.

Strangely enough, the South was first attacked in the true scientific spirit by Captain Cook and later by Bellingshausen. Sealing and whaling ventures followed in their train.

At last the era had come for the expedition, planned, administered, equipped and carried out with a definite objective. It is characteristic of the race of men that the first design should have centred on the Pole—the top of the earth, the focus of longitude, the magic goal, to reach which no physical sacrifice was too great. The heroism of Parry is a type of that adamant persistence which has made the history of the conquest of the Poles a volume in which disaster and death have played a large part. It followed on years of polar experience, it resulted from an exact knowledge of geographical and climatic conditions, a fear-

FOREWORD

less anticipation, expert information on the details of transport—and the fortune of the brave—that Peary and Amundsen had their reward in the present generation.

Meanwhile, in the wake of the pioneers of new land there were passing the scientific workers born in the early nineteenth century. Sir James Clark Ross is an epitome of that expansive enthusiasm which was the keynote of the life of Charles Darwin. The classic “Voyage of the *Beagle*” (1831-36) was a triumph of patient rigorous investigation conducted in many lands outside the polar circles.

The methods of Darwin were developed in the *Challenger* Expedition (1872) which worked even to the confines of the southern ice. And the torch of the pure flame of Science was handed on. It was the same consuming ardour which took Nansen across the plateau of Greenland, which made him resolutely propound the theory of the northern ice-drift, to maintain it in the face of opposition and ridicule and to plan an expedition down to the minutest detail in conformity therewith. The close of the century saw Science no longer the mere appendage but the actual basis of exploratory endeavour.

Disinterested research and unselfish specialization are the phrases born to meet the intellectual demands of the new century.

The modern polar expedition goes forth with finished appliances, with experts in every department—sailors, artisans, soldiers and students in medley; supremely, with men who seek risk and privation—the glory of the dauntless past.

A. L. M.

INTRODUCTION

ONE of the oft-repeated questions for which I usually had a ready answer, at the conclusion of Sir Ernest Shackleton's Expedition (1907-09) was, "Would you like to go to the Antarctic again?" In the first flush of the welcome home and for many months, during which the keen edge of pleasure under civilized conditions had not entirely worn away, I was inclined to reply with a somewhat emphatic negative. But, once more a man in the world of men, lulled in the easy repose of routine, and performing the ordinary duties of a workaday world, old emotions awakened, the grand sweet days returned in irresistible glamour, faraway "voices" called:

. . . from the wilderness, the vast and Godlike spaces,
The stark and sullen solitudes that sentinel the Pole.

There always seemed to be something at the back of my mind, stored away for future contemplation, and it was an idea which largely matured during my first sojourn in the far South. At times, during the long hours of steady tramping across the trackless snow-fields, one's thoughts flow in a clear and limpid stream, the mind is unruffled and composed and the passion of a great venture springing suddenly before the imagination is sobered by the calmness of pure reason. Perchance this is true of certain moments, but they are rare and fleeting. It may have been in one such phase that I suddenly found myself eager for more than a glimpse of the great span of Antarctic coast lying nearest to Australia.

Professor T. W. E. David, Dr. F. A. Mackay and I, when seeking the South Magnetic Pole during the summer of

INTRODUCTION

1908-09, had penetrated farthest into that region on land. The limiting outposts had been defined by other expeditions; at Cape Adare on the east and at Gaussberg on the west. Between them lay my "Land of Hope and Glory," of whose outline and glacial features the barest evidence had been furnished. There, bordering the Antarctic Circle, was a realm far from the well-sailed highways of many of the more recent Antarctic expeditions.

The idea of exploring this unknown coast took firm root in my mind while I was on a visit to Europe in February 1910. The prospects of an expedition operating to the west of Cape Adare were discussed with the late Captain R. F. Scott and I suggested that the activities of his expedition might be arranged to extend over the area in question. Finally he decided that his hands were already too full to make any definite proposition for a region so remote from his own objective.

Sir Ernest Shackleton was warmly enthusiastic when the scheme was laid before him, hoping for a time to identify himself with the undertaking. It was in some measure due to his initiative that I felt impelled eventually to undertake the organization and leadership of an expedition.

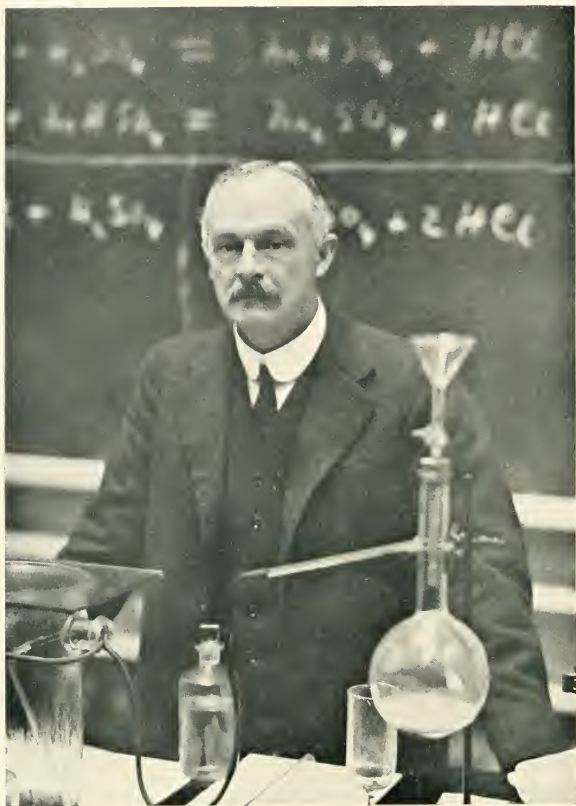
For many reasons, besides the fact that it was the country of my home and Alma Mater, I was desirous that the Expedition should be maintained by Australia. It seemed to me that here was an opportunity to prove that the young men of a young country could rise to those traditions which have made the history of British Polar exploration one of triumphant endeavour as well as of tragic sacrifice. And so I was privileged to rally the "sons of the younger son."

A provisional plan was drafted and put before the Australasian Association for the Advancement of Science at their meeting held at Sydney in January 1911, with a request for approval and financial assistance. Both were unani- mously granted, a sum of £1000 was voted and committees were formed to co-operate in the arrangement of a scientific

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PROFESSOR T. W. EDGEWORTH DAVID



PROFESSOR ORME MASSON

INTRODUCTION

programme and to approach the Government with a view to obtaining substantial help.

The three leading members of the committees were Professor Orme Masson (President), Professor T. W. Edgeworth David (President Elect) and Professor G. C. Henderson (President of the Geographical Section). All were zealous and active in furthering the projects of the Expedition.

Meanwhile I had laid my scheme of work before certain prominent Australians and some large donations* had been promised. The sympathy and warm-hearted generosity of these gentlemen was an incentive for me to push through my plans at once to a successful issue.

I therefore left immediately for London with a view to making arrangements there for a vessel suitable for polar exploration, to secure sledging dogs from Greenland and furs from Norway, and to order the construction of certain instruments and equipment. It was also my intention to gain if possible the support of Australians residing in London. The Council of the University of Adelaide, in a broad-minded scientific spirit, granted me the necessary leave of absence from my post as lecturer, to carry through what had now resolved itself into an extensive and prolonged enterprise.

During my absence, a Committee of the Australasian Association for the Advancement of Science approached the Commonwealth Government with an appeal for funds. Unfortunately it was the year (1911) of the Coronation of his Majesty King George V, and the leading members of the Cabinet were in England, so the final answer to the deputation was postponed. I was thus in a position of some difficulty, for many requirements had to be ordered without delay if the Expedition were to get away from Australia before the end of the year.

At length, through the kindness of Lord Northcliffe, the columns of the *Daily Mail* were opened to us and Sir Ernest Shackleton made a strong appeal on our behalf. The Royal Geographical Society set the seal of its approval on the

* Refer to Finance Appendix.

INTRODUCTION

aims of the Expedition and many donations were soon afterwards received.

At this rather critical period I was fortunate in securing the services of Captain John King Davis, who was in future to act as Master of the vessel and Second in Command of the Expedition. He joined me in April 1911, and rendered valuable help in the preliminary arrangements. Under his direction the s.y. *Aurora* was purchased and refitted.

The few months spent in London were anxious and trying, but the memory of them is pleasantly relieved by the generosity and assistance which were meted out on every hand. Sir George Reid, High Commissioner for the Australian Commonwealth, I shall always remember as an ever-present friend. The preparations for the scientific programme received a strong impetus from well-known Antarctic explorers, notably Dr. W. S. Bruce, Dr. Jean Charcot, Captain Adrian de Gerlache, and the late Sir John Murray and Mr. J. Y. Buchanan of the *Challenger* Expedition. In the dispositions made for oceanographical work I was indebted for liberal support to H.S.H. the Prince of Monaco.

In July 1911 I was once more in Australia, a large proportion of my time being occupied with finance, the purchase and concentration of stores and equipment and the appointment of the staff. In this work I was aided by Professors Masson and David and by Miss Ethel Bage, who throughout this busy period acted in an honorary capacity as secretary in Melbourne.

Time was drawing on and the funds of the Expedition were wholly inadequate to the needs of the moment, until Mr. T. H. Smeaton, M.P., introduced a deputation to the Hon. John Verran, Premier of South Australia. The deputation, organized to approach the State Government for a grant of £5000, was led by the Right Hon. Sir Samuel Way, Bart., Chief Justice of South Australia and Chancellor of the Adelaide University, and supported by Mr. Lavington Bonython, Mayor of Adelaide, T. Ryan, M.P., the Presidents

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of several scientific societies and members of the University staff. This sum was eventually forthcoming and it paved the way to greater things.

In Sydney, Professor David approached the State Government on behalf of the Expedition for financial support, and, through the Acting Premier, the Hon. W. A. Holman, £7000 was generously promised. The State of Victoria through the Hon. W. Watt, Premier of Victoria, supplemented our funds to the extent of £6000.

Upheld by the prestige of a large meeting convened in the Melbourne Town Hall during the spring, the objects of the Australasian Antarctic Expedition were more widely published. On that memorable occasion the Governor-General, Lord Denman, acted as chairman, and among others who participated were the Hon. Andrew Fisher (Prime Minister of the Commonwealth), the Hon. Alfred Deakin (Leader of the Opposition), Professor Orme Masson (President A.A.A.S. and representative of Victoria), Senator Walker (representing New South Wales) and Professor G. C. Henderson (representing South Australia).

Soon after this meeting the Commonwealth Government voted £5000, following a grant of £2000 made by the British Government at the instance of Lord Denman, who from the outset had been a staunch friend of the Expedition.

At the end of October 1911 all immediate financial anxiety had passed, and I was able to devote myself with confidence to the final preparations.

Captain Davis brought the *Aurora* from England to Australia, and on December 2, 1911, we left Hobart for the South. A base was established on Macquarie Island, after which the ship pushed through the ice and landed a party on an undiscovered portion of the Antarctic Continent. After a journey of fifteen hundred miles to the west of this base another party was landed and then the *Aurora* returned to Hobart to refit and to carry out oceanographical investigations, during the year 1912, in the waters south of Australia and New Zealand.

INTRODUCTION

In December 1912 Captain Davis revisited the Antarctic to relieve the two parties who had wintered there. A calamity befell my own sledging party, Lieut. B. E. S. Ninnis and Dr. X. Mertz both lost their lives and my arrival back at Winter Quarters was delayed for so long, that the *Aurora* was forced to leave five men for another year to prosecute a search for the missing party. The remainder of the men, ten in number, and the party fifteen hundred miles to the west were landed safely at Hobart in March 1912.

Thus the prearranged plans were upset by my non-return and the administration of the Expedition in Australia was carried out by Professor David, whose special knowledge was invaluable at such a juncture.

Funds were once more required, and, during the summer of 1912, Captain Davis visited London and secured additional support, while the Australasian Association for the Advancement of Science again successfully approached the Commonwealth Government (The Right Hon. J. H. Cook, Prime Minister). In all, the sum of £8000 was raised to meet the demands of a second voyage of relief.

The party left on Macquarie Island, who had agreed to remain at the station for another year, ran short of food during their second winter. The New Zealand Government rendered the Expedition a great service in dispatching stores to them by the *Tutanekai* without delay.

Finally, in the summer of 1913, the *Aurora* set out on her third cruise to the far South, picking up the parties at Macquarie Island and in the Antarctic, carried out observations for two months amid the ice and reached Adelaide late in February 1914.

Throughout a period of more than three years Professors David and Masson—the fathers of the Expedition—worked indefatigably and unselfishly in its interests. Unbeknown to them I have taken the liberty to reproduce the only photographs at hand of these gentlemen, which action I hope they will view favourably. That of Professor David needs

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CAPTAIN JOHN KING DAVIS

Thomson

INTRODUCTION

some explanation : It is a snapshot taken at Relief Inlet, South Victoria Land, at the moment when the Northern Party of Shackleton's Expedition, February 1909, was rescued by the *S.Y. Nimrod*.

In shipping arrangements Capt. Davis was assisted throughout by Mr. J. J. Kinsey, Christchurch, Capt. Barter, Sydney, and Mr. F. Hammond, Hobart.

Such an undertaking is the work of a multitude and it is only by sympathetic support from many sources that a measure of success can be expected. In this connexion there are many names which I recall with warm gratitude. It is impossible to mention all to whom the Expedition is indebted, but I trust that none of those who have taken a prominent part will fail to find an acknowledgment somewhere in these volumes.

I should specially mention the friendly help afforded by the Australasian Press, which has at all times given the Expedition favourable and lengthy notices, insisting on its national and scientific character.

With regard to the conduct of the work itself, I was seconded by the whole-hearted co-operation of the members, my comrades, and what they have done can only be indicated in this narrative.

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CHAPTER I

THE PROBLEM AND PREPARATIONS

NOTWITHSTANDING the fact that it has been repeatedly stated in the public press that the Australasian Antarctic expedition had no intention of making the South Geographical Pole its objective, it is evident that our aims were not properly realized by a large section of the British public, considering that many references have appeared in print attributing that purpose to the undertaking. With three other Antarctic expeditions already in the field, it appeared to many, therefore, that the venture was entirely superfluous.

The Expedition had a problem sketched in unmistakable feature, and the following pages will shortly set forth its historical origin and rationale.

The Antarctic problem* assumed its modern aspect after Captain Cook's circumnavigation of the globe in high southern latitudes, accomplished between 1772 and 1775. Fact replaced the fiction and surmise of former times, and maps appeared showing a large blank area at the southern extremity of the earth, where speculative cartographers had affirmed the existence of habitable land extending far towards the Equator. Cook's voyage made it clear that if there were any considerable mass of Antarctic land, it must indubitably lie within the Antarctic Circle, and be subjected to such stringent climatic conditions as to render it an unlikely habitation for man.

* Dr. H. R. Mill has compiled a complete account of Antarctic exploration in his "Siege of the South Pole."

Refer also to the Historical Appendix for an abridged statement.

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Cook's reports of seals on the island of South Georgia initiated in the Antarctic seas south of America a commercial enterprise, which is still carried on, and has incidentally thrown much light upon the geography of the South Polar regions. Indeed, almost the whole of such information, prior to the year 1839, was the outcome of sealing and whaling projects.

About the year 1840, a wave of scientific enthusiasm resulted in the dispatch of three national expeditions by France, the United States, and Great Britain; part at least of whose programmes was Antarctic exploration. Russia had previously sent out an expedition which had made notable discoveries.

The contributions to knowledge gained at this period were considerable. Those carried back to civilization by the British expedition under Ross, are so well known that they need not be described. The French under Dumont D'Urville and the Americans under Wilkes visited the region to the southward of Australia—the arena of our own efforts—and frequent references will be made to their work throughout this story.

What has been termed the period of averted interest now intervened, before the modern movement set in with overpowering insistence. It was not till 1897 that it had commenced in earnest. Since then many adventurers have gone forth; most of the prominent civilized nations taking their share in exploration. By their joint efforts some, at least, of the mystery of Antarctica has been dispelled.

It is now a commonplace, largely in the world of geographical concerns, that the earth has still another continent, unique in character, whose ultimate bounds are merely pieced together from a fragmentary outline. The Continent itself appears to have been sighted for the first time in the year 1820, but no human being actually set foot on it until 1895. The Belgian expedition under de Gerlache was the first to experience the Antarctic winter, spending the year 1898 drifting helplessly, frozen in the pack-ice, to the south-

VIRGIN SOLITUDES

Paget colour photo by Correll



THE PROBLEM AND PREPARATIONS

ward of America. In the following year a British expedition under Borchgrevinck, wintering at Cape Adare, passed a year upon the Antarctic mainland.

The main efforts of recent years have been centred upon the two more accessible areas, namely, that in the American Quadrant * which is prolonged as a tongue of land outside the Antarctic Circle, being consequently less beset by ice; secondly, the vicinity of the Ross Sea in the Australian Quadrant. It is because these two favoured domains have for special reasons attracted the stream of exploration that the major portion of Antarctica is unknown. Nevertheless, one is in a position to sketch broad features which will probably not be radically altered by any future expeditions.

Certain it is that a continent approaching the combined areas of Australia and Europe lies more or less buried beneath the South Polar snows; though any statement of the precise area is insufficient for a proper appreciation of the magnitude, unless its elevated plateau-like character be also taken into consideration. It appears to be highest over a wide central crown rising to more than ten thousand feet. Of the remainder, there is little doubt that the major portion stands as high as six thousand feet. The average elevation must far exceed that of any other continent, for, with peaks nineteen thousand feet above sea-level, its mountainous topography is remarkable. Along the coast of Victoria Land, in the Australian Quadrant, are some of the most majestic vistas of alpine scenery that the world affords. Rock exposures are rare, ice appearing everywhere except in the most favoured places.

Regarding plant and animal life upon the land there is

* For convenience, the Antarctic regions may be referred to in four main divisions, corresponding with the quadrants of the hemisphere. Of the several suggestions thrown out by previous writers, the one adopted here is that based on the meridian of Greenwich, referring the quadrants to an adjacent continent or ocean. Thus the American Quadrant lies between 0° and 90° W., the African Quadrant between 0° and 90° E., and the Australian Quadrant between 90° and 180° E. The fourth division is called the Pacific Quadrant, since ocean alone lies to the north of it.

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little to say. The vegetable kingdom is represented by plants of low organization such as mosses, lichens, diatoms and algæ. The animal world, so far as true land-forms are concerned, is limited to types like the protozoa (lowest in the organic scale), rotifera and minute insect-like mites which lurk hidden away amongst the tufts of moss or on the under side of loose stones. Bacteria, most fundamental of all, at the basis, so to speak, of animal and vegetable life, have a manifold distribution.

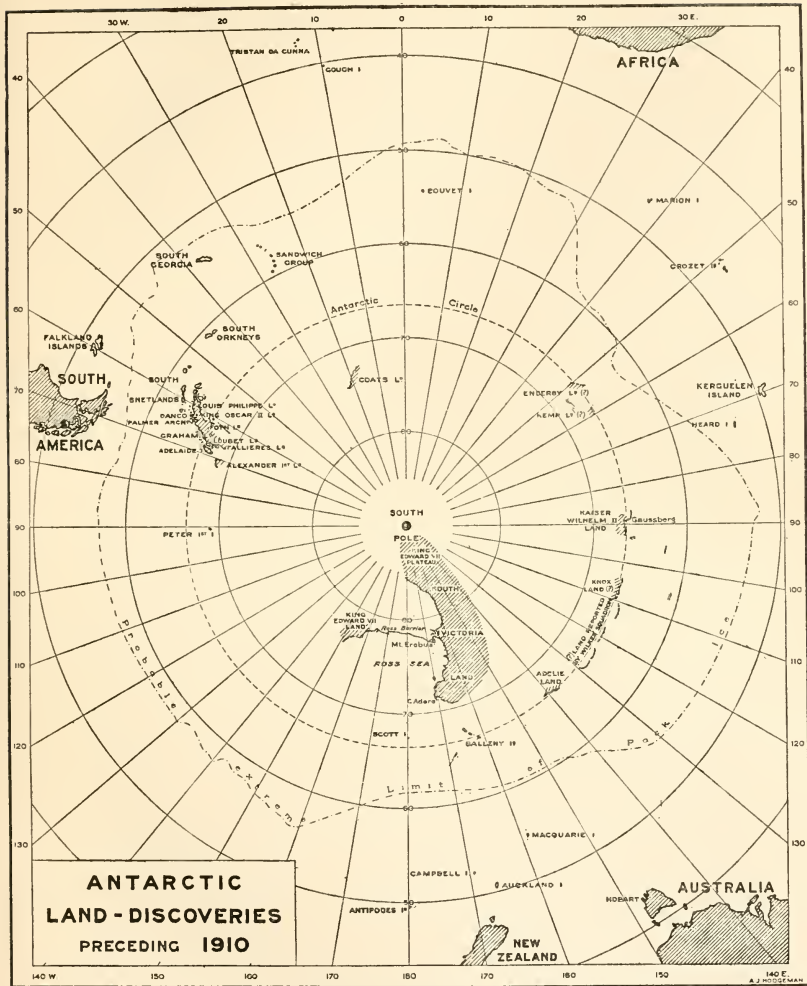
It is a very different matter when we turn to the life of the neighbouring seas, for that vies in abundance with the warmer waters of lower latitudes. There are innumerable seals, many sea-birds and millions of penguins. As all these breed on Antarctic shores, the coastal margin of the continent is not so desolate.

In view of the fact that life, including land-mammals, is abundant in the North Polar regions, it may be asked why analogous forms are not better represented in corresponding southern latitudes. Without going too deeply into the question, it may be briefly stated, firstly, that a more widespread glaciation than at present prevails invested the great southern continent and its environing seas, within recent geological times, effectually exterminating any pre-existing land life. Secondly, since that period the continent has been isolated by a wide belt of ocean from other lands, from which restocking might have taken place after the manner of the North Polar regions. Finally, climatic conditions in the Antarctic are, latitude for latitude, much more severe than in the Arctic.

With regard to climate in general, Antarctica has the lowest mean temperature and the highest wind-velocity of any land existing. This naturally follows from the fact that it is a lofty expanse of ice-clad land circumscribing the Pole, and that the Antarctic summer occurs when the earth is farther from the sun than is the case during the Arctic summer.

There are those who would impatiently ask, "What is the use of it all?" The answer is brief.

THE PROBLEM AND PREPARATIONS



ANTARCTIC DISCOVERIES PRECEDING THE YEAR 1910

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The polar regions, like any other part of the globe, may be said to be paved with facts, the essence of which it is necessary to acquire before knowledge of this special zone can be brought to even a provisional exactitude. On the face of it, polar research may seem to be specific and discriminating, but it must be remembered that an advance in any one of the departments into which, for convenience, science is artificially divided, conduces to the advantage of all. Science is a homogeneous whole. If we ignore the facts contained in one part of the world, surely we are hampering scientific advance. It is obvious to every one that, given only a fraction of the pieces, it is a much more difficult task to put together a jig-saw puzzle and obtain an idea of the finished pattern than were all the pieces at hand. The pieces of the jig-saw puzzle are the data of science.

Though it is not sufficiently recognized, the advance of science is attended by a corresponding increase in the creature comforts of man. Again, from an economic aspect, the frozen South may not attract immediate attention. But who can say what a train of enterprise the future may bring?

Captain James Cook, on his return to London after the circumnavigation of Antarctica, held that the far-southern lands had no future. Yet, a few years later, great profits were being returned to Great Britain and the United States from sealing-stations established as a result of Cook's own observations. At the present day, several whaling companies have flourishing industries in the Antarctic waters within the American Quadrant.

Even now much can be said in regard to the possibilities offered by the Antarctic regions for economic development, but, year by year, the outlook will widen, since man is constantly resorting to subtler and more ingenious artifice in applying Nature's resources. It will be remembered that Charles Darwin, when in Australia, predicted a very limited commercial future for New South Wales. But the mastery of man overcame the difficulties which Darwin's too penetrating mind foresaw.



Adelie Land

THE WALL OF THE ANTARCTIC CONTINENT

Hurley



FINNER WHALES OF THE SOUTH

Hurley

THE PROBLEM AND PREPARATIONS

What will be the rôle of the South in the progress of civilization and in the development of the arts and sciences, is not now obvious. As sure as there is here a vast mass of land with potentialities, strictly limited at present, so surely will it be cemented some day within the universal plinth of things.

An unknown coast-line lay before the door of Australia. Following on the general advance of exploration, and as a sequel to several important discoveries, the time arrived when a complete elucidation of the Antarctic problem was more than ever desirable. In the Australian Quadrant, the broad geographical features of the Ross Sea area were well known, but of the remainder and greater portion of the tract only vague and imperfect reports could be supplied.

Before submitting our plans in outline, it will be as well to review the stage at which discovery had arrived when our Expedition came upon the scene.

The coast-line of the eastern extremity of the Australian Quadrant, including the outline of the Ross Sea and the coast west-north-west of Cape Adare as far as Cape North, was charted by Ross and has been amplified by seven later expeditions. In the region west of Cape North, recent explorers had done little up till 1911. Scott in the *Discovery* had disproved the existence of some of Wilkes's land; Shackleton in the *Nimrod* had viewed some forty miles of high land beyond Cape North; lastly, on the eve of our departure, Scott's *Terra Nova* had met two patches of new land—Oates Land—still farther west, making it evident that the continent ranged at least two hundred and eighty miles in a west-north-west direction from Cape Adare.

Just outside the western limit of the Australian Quadrant lies Gaussberg, discovered by a German expedition under Drygalski in 1902. Between the most westerly point sighted by the *Terra Nova* and Gaussberg, there is a circuit of two thousand miles, bordering the Antarctic Circle, which no vessel had navigated previous to 1840.

This was the arena of our activities and, therefore,

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a synopsis of the voyages of early mariners will be enlightening.

Balleny, a whaling-master, with the schooner *Eliza Scott* of one hundred and fifty-four tons, and a cutter, the *Sabrina* of fifty-four tons, was the first to meet with success in these waters. Proceeding southward from New Zealand in 1839, he located the Balleny Islands, a group containing active volcanoes, lying about two hundred miles off the nearest part of the mainland and to the north-west of Cape Adare. Leaving these islands, Balleny sailed westward keeping a look-out for new land. During a gale the vessels became separated and the *Sabrina* was lost with all hands. Balleny in the *Eliza Scott* arrived safely in England and reported doubtful land in 122° E. longitude, approximately. Dr. H. R. Mill says: "Although the name of the cutter *Sabrina* has been given to an appearance of land at this point, we cannot look upon its discovery as proved by the vague reference made by the explorers."

On January 1, 1840, Dumont D'Urville sailed southward from Hobart in command of two corvettes, the *Astrolabe* and the *Zelée*. Without much obstruction from floating ice, he came within sight of the Antarctic coast, thenceforth known as Adelie Land. The expedition did not set foot on the mainland, but on an adjacent island. They remained in the vicinity of the coast for a few days, when a gale sprang up which was hazardously weathered on the windward side of the pack-ice. The ships then cruised along the face of flat-topped ice-cliffs, of the type known as barrier-ice or shelf-ice, which were taken to be connected with land and named Côte Clarie. As will be seen later, Côte Clarie does not exist.

Dr. H. R. Mill sums up the work done by the French expedition during its eleven days' sojourn in the vicinity of the Antarctic coast:

"D'Urville's discoveries of land were of but little account. He twice traced out considerable stretches of a solid barrier of ice, and at one point saw and landed upon rocks in front of

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it ; but he could only give the vaguest account of what lay behind the barrier."

Wilkes of the American expedition proceeded south from Sydney at the close of 1839. His vessels were the *Vincennes*, a sloop of war of seven hundred and eighty tons, the *Peacock*, another sloop of six hundred and fifty tons, the *Porpoise*, a gun-brig of two hundred and thirty tons and a tender, the *Flying Fish* of ninety-six tons. The scientists of the expedition were precluded from joining in this part of the programme, and were left behind in Sydney. Wilkes himself was loud in his denunciation both of the ships and of the stores, though they had been specially assembled by the naval department. The ships were in Antarctic waters for a period of forty-two days, most of the time separated by gales, during which the crews showed great skill in navigating their ill-fitted crafts and suffered great hardships.

Land was reported almost daily, but, unfortunately, subsequent exploration has shown that most of the landfalls do not exist. Several soundings made by Wilkes were indicative of the approach to land, but he must have frequently mistaken for it distant ice-masses frozen in the pack. Experience has proved what deceptive light-effects may be observed amid the ice and how easily a mirage may simulate reality.

Whatever the cause of Wilkes's errors, the truth remains that Ross sailed over land indicated in a rough chart which had been forwarded to him by Wilkes, just before the British expedition set out. More recently, Captain Scott in the *Discovery* erased many of the landfalls of Wilkes, and now we have still further reduced their number. The *Challenger* approached within fifteen miles of the western extremity of Wilkes's Termination Land, but saw no sign of it. The *Gauss* in the same waters charted Kaiser Wilhelm II Land well to the south of Termination Land, and the eastward continuation of the former could not have been visible from Wilkes's ship. After the voyage of the *Discovery*, the landfalls, the existence of which had not been disproved, might well

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have been regarded as requiring confirmation before their validity could be recognised.

The only spot where rocks were reported *in situ* was in Adelie Land, where the French had anticipated the Americans by seven days. Farther west, earth and stones had been collected by Wilkes from material embedded in floating masses of ice off the coast of his Knox Land. These facts lend credence to Wilkes's claims of land in that vicinity. His expedition did not once set foot on Antarctic shores, and, possibly on account of the absence of the scientific staff, his descriptions tend to be inexact and obscure. The soundings made by Wilkes were sufficient to show that he was probably in some places at no great distance from the coast, and, considering that his work was carried out in the days of sailing-ships, in unsuitable craft, under the most adverse weather conditions, with crews scurvy-stricken and discontented, it is wonderful how much was achieved. We may amply testify that he did more than open the field for future expeditions.

After we had taken into account the valuable soundings of the *Challenger* (1872), the above comprised our knowledge concerning some two thousand miles of prospective coast lying to the southward of Australia, at a time when the plans of the Australasian expedition were being formulated.

The original plans for the expedition were somewhat modified upon my return from Europe. Briefly stated, it was decided that a party of five men should be stationed at Macquarie Island, a sub-antarctic possession of the Commonwealth. They were to be provided with a hut, stores and a complete wireless plant, and were to prosecute general scientific investigations, co-operating with the Antarctic bases in meteorological and other work. After disembarking the party at Macquarie Island, the *Aurora* was to proceed south on a meridian of 158° E. longitude, to the westward of which the Antarctic programme was to be conducted.

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Twelve men, provisioned and equipped for a year's campaign and provided with wireless apparatus, were to be landed in Antarctica on the first possible opportunity at what would constitute a main base. Thereafter, proceeding westward, it was hoped that a second and a third party, consisting of six and eight men respectively, would be successively established on the continent at considerable distances apart. Of course we were well aware of the difficulties of landing even one party, but, as division of our forces would under normal conditions secure more scientific data, it was deemed advisable to be prepared for exceptionally favourable circumstances.

Macquarie Island, a busy station in the days of the early sealers, had become almost neglected. Little accurate information was to be had regarding it, and no reliable map existed. A few isolated facts had been gathered of its geology, and the anomalous fauna and flora *sui generis* had been but partially described. Its position, eight hundred and fifty miles south-south-east of Hobart, gave promise of valuable meteorological data relative to the atmospheric circulation of the Southern Hemisphere and of vital interest to the shipping of Australia and New Zealand.

As to the Antarctic sphere of work, it has been seen that very little was known of the vast region which was our goal. It is sufficient to say that almost every observation would be fresh material added to the sum of human knowledge.

In addition to the work to be conducted from the land bases, it was intended that oceanographic investigations should be carried on by the *Aurora* as far as funds would allow. With this object in view, provision was made for the necessary apparatus which would enable the ship's party to make extensive investigations of the ocean and its floor over the broad belt between Australia and the Antarctic Continent. This was an important branch of study, for science is just as much interested in the greatest depths of the ocean as with the corresponding elevations of the land.

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Indeed, at the present day, the former is perhaps the greater field.

The scope of our intentions was regarded by some as over-ambitious, but knowing

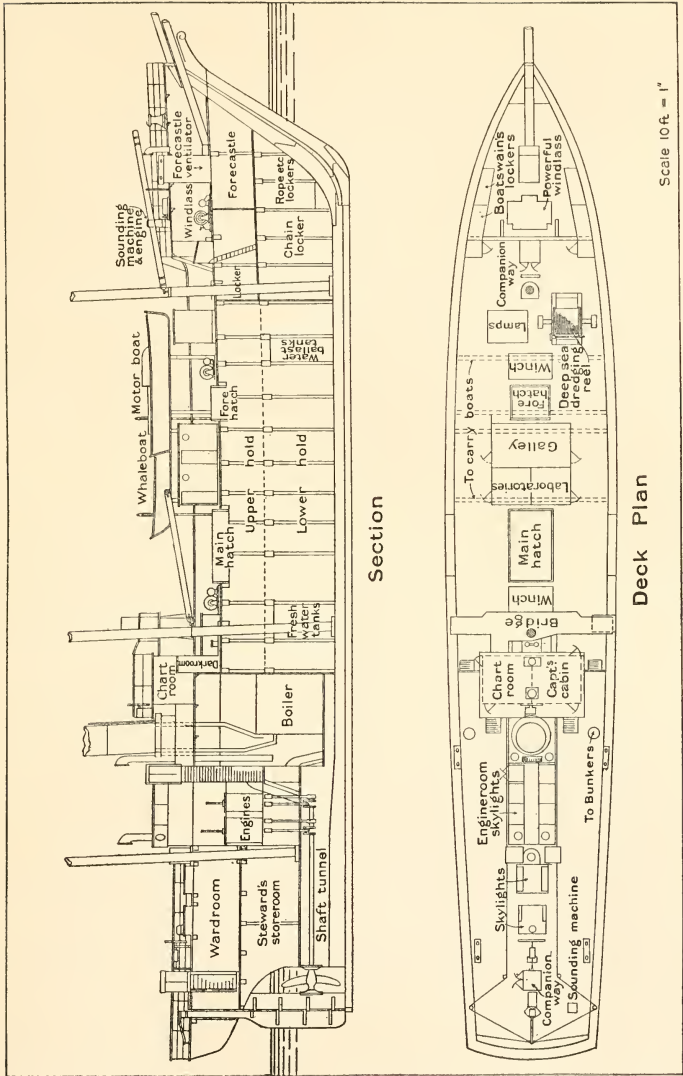
How far high failure overleaps the bound
Of low successes,

and seeing nothing impossible in these arrangements, we continued to adhere to them as closely as possible, with what fortune remains to be told.

To secure a suitable vessel was a matter of fundamental importance. There was no question of having a ship built to our design, for the requisite expenditure might well have exceeded the whole cost of our Expedition. Accordingly the best obtainable vessel was purchased, and modified to fulfil our requirements. Such craft are not to be had in southern waters; they are only to be found engaged in Arctic whaling and sealing.

The primary consideration in the design of a vessel built to navigate amid the ice is that the hull be very staunch, capable of driving into the pack and of resisting lateral pressure, if the ice should close in around it.

So a thick-walled timber vessel, with adequate stiffening in the framework, would meet the case. The construction being of wood imparts a certain elasticity, which is of great advantage in easing the shock of impacts with floating ice. As has been tragically illustrated in a recent disaster, the ordinary steel ship would be ripped on its first contact with the ice. Another device, to obviate the shock and to assist in forging a way through the floe-ice, is to have the bow cut away below the water-line. Thus, instead of presenting to the ice a vertical face, which would immediately arrest the ship and possibly cause considerable damage on account of the sudden stress of the blow, a sloping, overhanging bow is adopted. This arrangement enables the bow to rise over the impediment, with a gradual slackening of speed. The



Section

Deck Plan

Scale 10 ft = 1"

PLAN AND SECTION OF THE S.Y. AURORA.

THE HOME OF THE BLIZZARD

immense weight put upon the ice crushes it and the ship settles down, moving ahead and gathering speed to meet the next obstacle.

Of importance second only to a strong hull is the possession of sails in addition to engines. The latter are a *sine qua non* in polar navigation, whilst sails allow of economy in the consumption of coal, and always remain as a last resort should the coal-supply be exhausted or the propeller damaged.

The *Aurora*, of the Newfoundland sealing fleet, was ultimately purchased and underwent necessary alterations. She was built in Dundee in 1876, but though by no means young was still in good condition and capable of buffeting with the pack for many a year. Also, she was not without a history, for in the earlier days she was amongst those vessels which hurried to the relief of the unfortunate Greely expedition.

The hull was made of stout oak planks, sheathed with greenheart and lined with fir. The bow, fashioned on cut-away lines, was a mass of solid wood, armoured with steel plates. The heavy side-frames were braced and stiffened by two tiers of horizontal oak beams, upon which were built the 'tween decks and the main deck. Three bulkheads isolated the fore-peak, the main hold, the engine-room and the after living-quarters respectively.

A hull of such strength would resist a heavy strain, and, should it be subjected to lateral pressure, would in all probability rise out of harm's way. However, to be quite certain of this and to ensure safety in the most extreme case it is necessary that the hull be modelled after the design adopted by Nansen in the *Fram*.

The principal dimensions were, length one hundred and sixty-five feet, breadth thirty feet, and depth eighteen feet.

The registered tonnage was three hundred and eighty-six, but the actual carrying capacity we found to be about six hundred tons.

The engines, situated aft, were compound, supplied with steam from a single boiler. The normal power registered was



THE *AURORA* CROSSING THE EQUATOR, AUGUST 1911

Metz



FRANK WILD

THE PROBLEM AND PREPARATIONS

ninety-eight horse-power, working a four-bladed propeller, driving it at the rate of sixty or seventy revolutions per minute (six to ten knots per hour).

Steam was also laid on to a winch, aft, for handling cargo in the main hold, and to a forward steam-windlass. The latter was mainly used for raising the anchor and manipulating the deep-sea dredging-cable.

The ship was square on the foremast and schooner-rigged on the main and mizen masts.

Between the engine-room bulkhead and the chain and sail locker was a spacious hold. Six large steel tanks built into the bottom of the hold served for the storage of fresh water and at any time when empty could be filled with seawater, offering a ready means of securing emergency ballast.

On the deck, just forward of the main hatch, was a deck-house, comprising cook's galley, steward's pantry and two laboratories. Still farther forward was a small lamp-room for the storage of kerosene, lamps and other necessaries. A lofty fo'c'sle-head gave much accommodation for carpenters', shipwrights' and other stores. Below it, a capacious fo'c'sle served as quarters for a crew of sixteen men.

Aft, the chart-room, captain's cabin and photographic dark-room formed a block leading up to the bridge, situated immediately in front of the funnel. Farther aft, behind the engine-room and below the poop deck, was the ward-room a central space sixteen feet by eight feet, filled by the dining-table and surrounded by cabins with bunks for twenty persons.

From the time the *Aurora* arrived in London to her departure from Australia, she was a scene of busy activity, as alterations and replacements were necessary to fit her for future work.

In the meantime, stores and gear were being assembled. Purchases were made and valuable donations received both in Europe and Australia. Many and varied were the requirements, and some idea of their great multiplicity will be

THE HOME OF THE BLIZZARD

gained by referring to the appendices dealing with stores, clothing and instruments.

Finally, reference may be made in this chapter to the staff. In no department can a leader spend time more profitably than in the selection of the men who are to accomplish the work. Even when the expedition has a scientific basis, academic distinction becomes secondary in the choice of *men*. Fiala, as a result of his Arctic experience, truly says, "Many a man who is a jolly good fellow in congenial surroundings will become impatient, selfish and mean when obliged to sacrifice his comfort, curb his desires and work hard in what seems a losing fight. The first consideration in the choice of men for a polar campaign should be the moral quality. Next should come mental and physical powers."

For polar work the great desideratum is tempered youth. Although one man at the age of fifty may be as strong physically as another at the age of twenty, it is certain that the exceptional man of fifty was also an exceptional man at twenty. On the average, after about thirty years of age, the elasticity of the body to rise to the strain of emergency diminishes, and, when forty years is reached, a man, medically speaking, reaches his acme. After that, degeneration of the fabric of the body slowly and maybe imperceptibly sets in. As the difficulties of exploration in cold regions approximate to the limit of human endurance and often enough exceed it, it is obvious that the above generalizations must receive due weight.

But though age and with it the whole question of physical fitness must ever receive primary regard, yet these alone in no wise fit a man for such an undertaking. The qualifications of mental ability, acquaintance with the work and sound moral quality have to be essentially borne in mind. The man of fifty might then be placed on a higher plane than his younger companion.

With regard to alcohol and tobacco, it may be maintained on theoretical grounds that a man is better without

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them, but, on the other hand, his behaviour in respect to such habits is often an index to his self-control.

Perfection is attained when every man individually works with the determination to sacrifice all personal predispositions to the welfare of the whole.

Ours proved to be a very happy selection. The majority of the men chosen as members of the land parties were young graduates of the Commonwealth and New Zealand Universities, and almost all were representative of Australasia. Among the exceptions was Mr. Frank Wild, who was appointed leader of one of the Antarctic parties. Wild had distinguished himself in the South on two previous occasions, and now is in the unique position of being, as it were, the oldest resident of Antarctica. Our sojourn together at Cape Royds with Shackleton had acquainted me with Wild's high merits as an explorer and leader.

Lieutenant B. E. S. Ninnis of the Royal Fusiliers, Dr. X. Mertz, an expert ski-runner and mountaineer, and Mr. F. H. Bickerton in charge of the air-tractor sledge, were appointed in London. Reference has already been made to Captain Davis: to him were left all arrangements regarding the ship's complement.

A "Who's who" of the staff appears as an appendix.

CHAPTER II

THE LAST DAYS AT HOBART AND THE VOYAGE TO MACQUARIE ISLAND

“ Let us probe the silent places, let us seek what luck betide us ;
Let us journey to a lonely land I know.
There’s a whisper on the night-wind, there’s a star agleam to guide us.
And the Wild is calling, calling—Let us go.”—SERVICE.

IT will be convenient to pick up the thread of our story upon the point of the arrival of the *Aurora* in Hobart, after her long voyage from London during the latter part of the year 1911.

Captain Davis had written from Cape Town stating that he expected to reach Hobart on November 4. In company with Mr. C. C. Eitel, secretary of the Expedition, I proceeded to Hobart, arriving on November 2.

Early in the morning of November 4 the Harbour Board received news that a wooden vessel, barquentine-rigged, with a crow’s-nest on the mainmast, was steaming up the D’Entrecasteaux Channel. This left no doubt as to her identity and so, later in the day, we joined Mr. Martelli, the assistant harbour-master, and proceeded down the river, meeting the *Aurora* below the quarantine ground.

We heard that they had had a very rough passage after leaving the Cape. This was expected, for several liners, travelling by the same route, and arriving in Australian waters a few days before, had reported exceptionally heavy weather.

Before the ship had reached Queen’s Wharf, the berth generously provided by the Harbour Board, the Greenland

THE LAST DAYS AT HOBART

dogs were transferred to the quarantine ground, and with them went Dr. Mertz and Lieutenant Ninnis, who gave up all their time during the stay in Hobart to the care of those important animals. A feeling of relief spread over the whole ship's company as the last dog passed over the side, for travelling with a deck cargo of dogs is not the most enviable thing from a sailor's point of view. Especially is this the case in a sailing-vessel where room is limited, and consequently dogs and ropes are mixed indiscriminately.

Evening was just coming on when we reached the wharf, and, as we ranged alongside, the Premier, Sir Elliot Lewis, came on board and bade us welcome to Tasmania.

Captain Davis had much to tell, for more than four months had elapsed since my departure from London, when he had been left in charge of the ship and of the final arrangements.

At the docks there had been delays and difficulties in the execution of the necessary alterations to the ship, in consequence of strikes and the Coronation festivities. It was so urgent to reach Australia in time for the ensuing Antarctic summer, that the recaulking of the decks and other improvements were postponed, to be executed on the voyage or upon arrival in Australia.

Captain Davis seized the earliest possible opportunity of departure, and the *Aurora* dropped down the Thames at midnight on July 27, 1911. As she threaded her way through the crowded traffic by the dim light of a thousand flickering flames gleaming through the foggy atmosphere, the dogs entered a protest peculiar to their "husky" kind. After a short preliminary excursion through a considerable range of the scale, they picked up a note apparently suitable to all and settled down to many hours of incessant and monotonous howling, as is the custom of these dogs when the fit takes them. It was quite evident that they were not looking forward to another sea voyage. The pandemonium made it all but impossible to hear the orders given for working the ship, and a collision was narrowly averted.

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During those rare lulls, when the dogs' repertoire temporarily gave out, innumerable sailors on neighbouring craft, wakened from their sleep, made the most of such opportunities to hurl imprecations in a thoroughly nautical fashion upon the ship, her officers, and each and every one of the crew.

On the way to Cardiff, where a full supply of coal was to be shipped, a gale was encountered, and much water came on board, resulting in damage to the stores. Some water leaked into the living quarters and, on the whole, several very uncomfortable days were spent. Such inconvenience at the outset undoubtedly did good, for many of the crew, evidently not prepared for emergency conditions, left at Cardiff. The scratch crew with which the *Aurora* journeyed to Hobart composed for the most part of replacements made at Cardiff, resulted in some permanent appointments of unexpected value to the Expedition.

At Cardiff the coal strike caused delay, but eventually some five hundred tons of the Crown Fuel Company's briquettes were got on board, and a final leave taken of English shores on August 4.

Cape Town, the only intermediate port of call, was reached on September 24, after a comparatively rapid and uneventful voyage. A couple of days sufficed to load coal, water and fresh provisions, and the course was then laid for Hobart.

Rough weather soon intervened, and Lieutenant Ninnis and Dr. Mertz, who travelled out by the *Aurora* in charge of the sledging-dogs, had their time fully occupied, for the wet conditions began to tell on their charges.

On leaving London there were forty-nine of these Greenland, Esquimaux sledging-dogs of which the purchase and selection had been made through the offices of the Danish Geographical Society. From Greenland they were taken to Copenhagen, and from thence transhipped to London, where Messrs. Spratt took charge of them at their dog-farm until the date of departure. During the voyage they were fed on the finest dog-cakes, but they undoubtedly felt the need of



GINGER AND HER FAMILY. ON THE VOYAGE FROM LONDON

Metc



QUEEN'S WHARF, HOBART, AN HOUR BEFORE SAILING, DECEMBER 2, 1911

Mertz



THE LAST VIEW OF HOBART NESTLING BELOW MT. WELLINGTON

Mertz

THE LAST DAYS AT HOBART

fresh meat and fish to withstand the cold and wet. In the rough weather of the latter part of the voyage water broke continually over the deck, so lowering their vitality that a number died from seizures, not properly understood at the time. In each case death was sudden, and preceded by similar symptoms. An apparently healthy dog would drop down in a fit, dying in a few minutes, or during another fit within a few days. Epidemics, accompanied by similar symptoms, are said to be common amongst these dogs in the Arctic regions, but no explanation is given as to the nature of the disease. During a later stage of the Expedition, when nearing Antarctica, several more of the dogs were similarly stricken. These were examined by Drs. McLean and Jones, and the results of post-mortems showed that in one case death was due to gangrenous appendicitis, in two others to acute gastritis and colitis.

The dog first affected caused some consternation amongst the crew, for, after being prostrated on the deck by a fit, it rose and rushed about snapping to right and left. The cry of "mad dog" was raised. Not many seconds had elapsed before all the deck hands were safely in the rigging, displaying more than ordinary agility in the act. At short intervals, other men, roused from watch below appeared at the fo'e'sle companion-way. To these the situation at first appeared comic, and called forth jeers upon their faint-hearted shipmates. The next moment, on the dog dashing into view, they found a common cause with their fellows and sprang aloft. Ere many minutes had elapsed the entire crew were in the rigging, much to the amusement of the officers. By this time the dog had disappeared beneath the fo'e'sle head, and Mertz and Ninnis entered, intending to dispatch it. A shot was fired and word passed that the deed was done: thereupon the crew descended, pressing forward to share in the laurels. Then it was that Ninnis, in the uncertain light, spying a dog of similar markings wedged in between some barrels, was filled with doubt and called out to Mertz that he had shot the wrong

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dog. In a flash the crew had once more climbed to safety. It was some time after the confirmation of the first execution that they could be prevailed upon to descend.

Several litters of puppies were born on the voyage, but all except one succumbed to the hardships of the passage.

The voyage from Cardiff to Hobart occupied eighty-eight days.

The date of departure south was fixed for 4 P.M. of Saturday, December 2, and a truly appalling amount of work had to be done before then.

Most of the staff had been preparing themselves for special duties; in this the Expedition was assisted by many friends.

A complete, detailed acknowledgment of all the kind help received would occupy much space. We must needs pass on with the assurance that our best thanks are extended to one and all.

Throughout the month of November, the staff continued to arrive in contingents at Hobart, immediately busying themselves in their own departments, and in sorting over the many thousands of packages in the great Queen's Wharf shed. Wild was placed in charge, and all entered heartily into the work. The exertion of it was just what was wanted to make us fit, and prepared for the sudden and arduous work of discharging cargo at the various bases. It also gave the opportunity of personally gauging certain qualities of the men, which are not usually evoked by a university curriculum.

Some five thousand two hundred packages were in the shed, to be sorted over and checked. The requirements of three Antarctic bases, and one at Macquarie Island were being provided for, and consequently the most careful supervision was necessary to prevent mistakes, especially as the omission of a single article might fundamentally affect the work of a whole party. To assist in discriminating the

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impedimenta, coloured bands were painted round the packages, distinctive of the various bases.

It had been arranged that, wherever possible, everything should be packed in cases of a handy size, to facilitate unloading and transportation; each about fifty to seventy pounds in weight.

In addition to other distinguishing marks, every package bore a different number, and the detailed contents were listed in a schedule for reference.

Concurrently with the progress of this work, the ship was again overhauled, repairs effected, and many deficiencies made good. The labours of the shipwrights did not interfere with the loading, which went ahead steadily during the last fortnight in November.

The tanks in the hold not used for our supply of fresh water were packed with reserve stores for the ship. The remainder of the lower hold and the bunkers were filled with coal. Slowly the contents of the shed diminished as they were transferred to the 'tween decks. Then came the overflow. Eventually, every available space in the ship was flooded with a complicated assemblage of gear, ranging from the comparatively undamageable wireless masts occupying a portion of the deck amidships, to a selection of prime Australian cheeses which filled one of the cabins, and pervaded the ward-room with an odour which remained one of its permanent associations.

Yet, heterogeneous and ill-assorted as our cargo may have appeared to the crowds of curious onlookers, Captain Davis had arranged for the stowage of everything with a nicety which did him credit. The complete effects of the four bases were thus kept separate, and available in whatever order was required. Furthermore, the removal of one unit would not break the stowage of the remainder, nor disturb the trim of the ship.

At a late date the air-tractor sledge arrived. The body was contained in one huge case which, though awkward, was comparatively light, the case weighing much more

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than the contents. This was securely lashed above the maindeck, resting on the fo'c'sle and two boat-skids.

As erroneous ideas have been circulated regarding the "aeroplane sledge," or more correctly "air-tractor sledge," a few words in explanation will not be out of place.

This machine was originally an R.E.P. monoplane, constructed by Messrs. Vickers and Co., but supplied with a special detachable, sledge-runner undercarriage for use in the Antarctic, converting it into a tractor for hauling sledges. It was intended that so far as its rôle as a flier was concerned, it would be chiefly exercised for the purpose of drawing public attention to the Expedition in Australia, where aviation was then almost unknown. With this object in view, it arrived in Adelaide at an early date accompanied by the aviator, Lieutenant Watkins, assisted by Bickerton. There it unfortunately came to grief, and Watkins and Wild narrowly escaped death in the accident. It was then decided to make no attempt to fly in the Antarctic; the wings were left in Australia and Lieutenant Watkins returned to England. In the meantime, the machine was repaired and forwarded to Hobart.

Air-tractors are great consumers of petrol of the highest quality. This demand, in addition to the requirements of two wireless plants and a motor-launch, made it necessary to take larger quantities than we liked of this dangerous cargo. Four thousand gallons of "Shell" benzine and one thousand three hundred gallons of "Shell" kerosene, packed in the usual four-gallon export tins, were carried as a deck cargo, monopolizing the whole of the poop-deck.

For the transport of the requirements of the Macquarie Island Base, the s.s. *Toroa*, a small steam-packet of one hundred and twenty tons, trading between Melbourne and Tasmanian ports, was chartered. It was arranged that this auxiliary should leave Hobart several days after the *Aurora*, so as to allow us time, before her arrival, to inspect the island, and to select a suitable spot for the location of the base. As she was well provided with passenger accommo-

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dation, it was arranged that the majority of the land party should journey by her as far as Macquarie Island.

The Governor of Tasmania, Sir Harry Barron, the Premier, Sir Elliot Lewis, and the citizens of Hobart extended to us the greatest hospitality during our stay, and, when the time came, gave us a hearty send-off.

Saturday, December 2 arrived, and final preparations were made. All the staff were united for the space of an hour at luncheon. Then began the final leave-taking. "God speed" messages were received from far and wide, and intercessory services were held in the Cathedrals of Sydney and Hobart.

We were greatly honoured at this time by the reception of kind wishes from Queen Alexandra and, at an earlier date, from his Majesty the King.

Proud of such universal sympathy and interest, we felt stimulated to greater exertions.

On arrival on board, I found Mr. Martelli, who was to pilot us down the river, already on the bridge. A vast crowd blockaded the wharf to give us a parting cheer.

At 4 P.M. sharp, the telegraph was rung for the engines, and, with a final expression of good wishes from the Governor and Lady Barron, we glided out into the channel, where our supply of dynamite and cartridges was taken on board. Captain G. S. Nares, whose kindness we had previously known, had the H.M.S. *Fantome* dressed in our honour, and lusty cheering reached us from across the water.

As we proceeded down the river to the Quarantine Station where the dogs were to be taken off, Hobart looked its best, with the glancing sails of pleasure craft skimming near the foreshores, and backed by the stately, sombre mass of Mount Wellington. The "land of strawberries and cream," as the younger members of the Expedition had come to regard it, was for ever to live pleasantly in our memories, to be recalled a thousand times during the adventurous months which followed.

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Mr. E. Joyce, whose name is familiar in connexion with previous Antarctic expeditions, and who had travelled out from London on business of the Expedition, was waiting in mid-stream with thirty-eight dogs, delivering them from a ketch. These were passed over the side and secured at intervals on top of the deck cargo.

The engines again began to throb, not to cease until the arrival at Macquarie Island. A few miles lower down the channel, the Premier, and a number of other friends and well-wishers who had followed in a small steamer, bade us a final adieu.

Behind lay a sparkling seascape and the Tasmanian littoral; before, the blue southern ocean heaving with an ominous swell. A glance at the barograph showed a continuous fall, and a telegram from Mr. Hunt, Head of the Commonwealth Weather Bureau, received a few hours previously, informed us of a storm-centre south of New Zealand, and the expectation of fresh south-westerly winds.

The piles of loose gear presented an indescribable scene of chaos, and, even as we rolled lazily in the increasing swell, the water commenced to run about the decks. There was no time to be lost in securing movable articles and preparing the ship for heavy weather. All hands set to work.

On the main deck the cargo was brought up flush with the top of the bulwarks, and consisted of the wireless masts, two huts, a large motor-launch, cases of dog biscuits and many other sundries. Butter to the extent of a couple of tons was accommodated chiefly on the roof of the main deck-house, where it was out of the way of the dogs. The roof of the chart-house, which formed an extension of the bridge proper, did not escape, for the railing offered facilities for lashing sledges; besides, there was room for tide-gauges, meteorological screens, and cases of fresh eggs and apples. Somebody happened to think of space unoccupied in the meteorological screens, and a few fowls were housed therein.



A BIG, FOLLOWING SEA

Hurley



MCLEAN WALKING AFT IN ROUGH WEATHER

Hurley



Hutley

CRUISING ALONG THE WEST COAST OF MACQUARIE ISLAND

THE LAST DAYS AT HOBART

On the poop-deck there were the benzine, sledges, and the chief magnetic observatory. An agglomeration of instruments and private gear rendered the ward-room well nigh impossible of access, and it was some days before everything was jammed away into corners. An unoccupied five-berth cabin was filled with loose instruments, while other packages were stowed into the occupied cabins, so as to almost defeat the purpose for which they were intended.

The deck was so encumbered that only at rare intervals was it visible. However, by our united efforts everything was well secured by 8 P.M.

It was dusk, and the distant highlands were limned in silhouette against the twilight sky. A tiny, sparkling lamp glimmered from Signal Hill its warm farewell. From the swaying poop we flashed back, "Good-bye, all snug on board."

Onward with a dogged plunge our laden ship would press. If *Fram* were "Forward," *she* was to be hereafter our *Aurora* of "Hope"—the Dawn of undiscovered lands.

Home and the past were effaced in the shroud of darkness, and thought leapt to the beckoning South—the "land of the midnight sun."

During the night the wind and sea rose steadily, developing into a full gale. In order to make Macquarie Island, it was important not to allow the ship to drive too far to the east, as at all times the prevailing winds in this region are from the west. Partly on this account, and partly because of the extreme severity of the gale, the ship was hove to with head to wind, wallowing in mountainous seas. Such a storm, witnessed from a large vessel, would be an inspiring sight, but was doubly so in a small craft, especially where the natural buoyancy had been largely impaired by overloading. With an unprecedented quantity of deck cargo, amongst which were six thousand gallons of benzine, kerosene and spirit, in tins which were none too strong, we might well have been excused a lively anxiety during those days. It seemed as if no power on earth could save the

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loss of at least part of the deck cargo. Would it be the indispensable huts amidships, or would a sea break on the benzine aft and flood us with inflammable liquid and gas ?

By dint of strenuous efforts and good seamanship, Captain Davis with his officers and crew held their own. The land parties assisted in the general work, constantly tightening up the lashings and lending "beef," a sailor's term for man-power, wherever required. For this purpose the members of the land parties were divided into watches, so that there were always a number patrolling the decks.

Most of us passed through a stage of sea-sickness, but, except in the case of two or three, it soon passed off. Seas deluged all parts of the ship. A quantity of ashes was carried down into the bilge-water pump and obstructed the steam-pump. Whilst this was being cleared, the emergency deck pumps had to be requisitioned. The latter were available for working either by hand-power or by chain-gearing from the after-winch.

The deck-plug of one of the fresh-water tanks was carried away and, before it was noticed, sea-water had entered to such an extent as to render our supply unfit for drinking. Thus we were, henceforth, on a strictly limited water ration.

The wind increased from bad to worse, and great seas continued to rise until their culmination on the morning of December 5, when one came aboard on the starboard quarter, smashed half the bridge and carried it away. Toucher was the officer on watch, and no doubt thought himself lucky in being, at the time, on the other half of the bridge.

The deck-rings holding the motor-launch drew, the launch itself was sprung and its decking stove-in.

On the morning of December 8 we found ourselves in latitude $49^{\circ} 56'$ S. and longitude $152^{\circ} 28'$ E., with the weather so far abated that we were able to steer a course for Macquarie Island.

During the heavy weather, food had been prepared only

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with the greatest difficulty. The galley was deluged time and again. It was enough to dishearten any cook, repeatedly finding himself amongst kitchen debris of all kinds, including pots and pans full and empty. Nor did the difficulties end in the galley, for food which survived until its arrival on the table, though not allowed much time for further mishap, often ended in a disagreeable mass on the floor or, tossed by a lurch of more than usual suddenness, entered an adjoining cabin. From such localities the elusive *pièce de résistance* was often rescued.

As we approached our rendezvous, whale-birds * appeared. During the heavy weather, Mother Carey's chickens only were seen, but, as the wind abated, the majestic wandering albatross, the sooty albatross and the mollymawk followed in our wake.

Whales were observed spouting, but at too great a distance to be definitely recognized.

At daybreak on December 11 land began to show up, and by 6 A.M. we were some sixteen miles off the west coast of Macquarie Island, bearing on about the centre of its length.

In general shape it is long and narrow, the length over all being twenty-one miles. A reef runs out for several miles at both extremities of the main island, reappearing again some miles beyond in isolated rocky islets: the Bishop and Clerk nineteen miles to the southward and the Judge and Clerk eight miles to the north.

The land everywhere rises abruptly from the sea or from an exaggerated beach to an undulating plateau-like interior, reaching a maximum elevation of one thousand four hundred and twenty-five feet. Nowhere is there a harbour in the proper sense of the word, though six or seven anchorages are recognized.

The island is situated in about 55° S. latitude, and the

* For the specific names refer to Appendix which is a glossary of special and unfamiliar terms.

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climate is comparatively cold, but it is the prevalence of strong winds that is the least desirable feature of its weather.

Sealing, so prosperous in the early days, is now carried on in a small way only, by a New Zealander, who keeps a few men stationed at the island during part of the year for the purpose of rendering down sea elephant and penguin blubber. Their establishment was known to be at the north end of the island near the best of the anchorages.

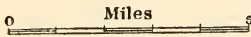
Captain Davis had visited the island in the *Nimrod*, and was acquainted with the three anchorages, which are all on the east side and sheltered from the prevailing westerlies. One of the old-time sealers had reported a cove suitable for small craft at the south-western corner, but the information was scanty, and recent mariners had avoided that side of the island. On the morning of our approach the breeze was from the south-east, and, being favourable, Captain Davis proposed a visit.

By noon, Caroline Cove, as it is called, was abreast of us. Its small dimensions, and the fact that a rocky islet for the most part blocks the entrance, at first caused some misgivings as to its identity.

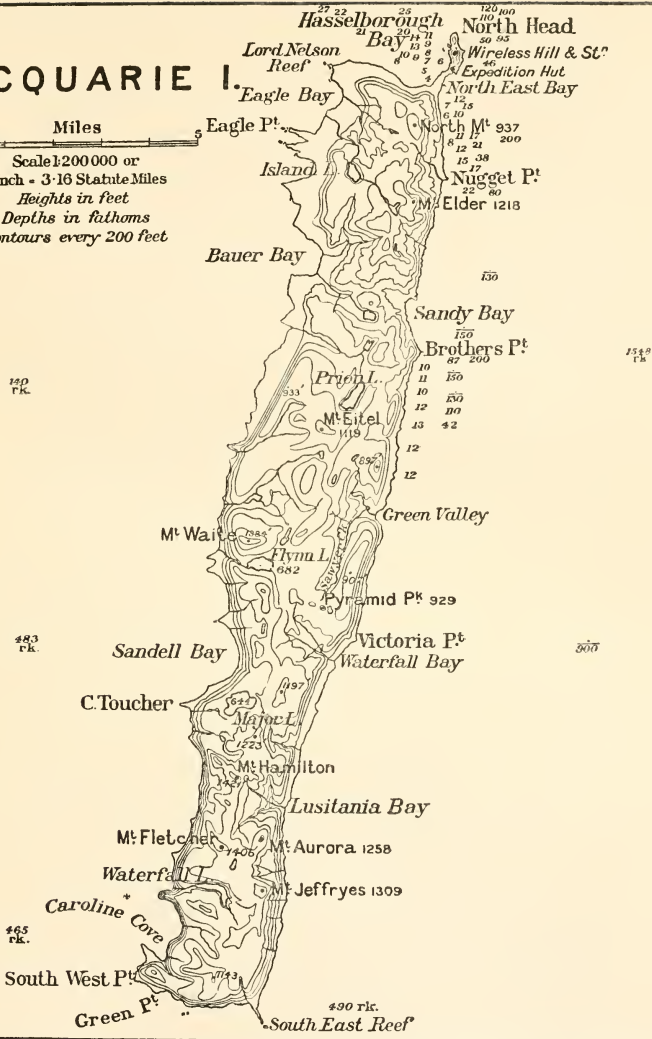
A boat was lowered, and a party of us rowed in towards the entrance, sounding at intervals to ascertain whether the *Aurora* could make use of it, should our inspection prove it a suitable locality for the land station.

We passed through a channel not more than eighty yards wide, but with deep water almost to the rocks on either side. A beautiful inlet now opened to view. Thick tussock-grass matted the steep hillsides, and the rocky shores, between the tide-marks as well as in the depths below, sprouted with a profuse growth of brown kelp. Leaping out of the water in scores around us were penguins of several varieties, in their actions reminding us of nothing so much as shoals of fish chased by sharks. Penguins were in thousands on the uprising cliffs, and from rookeries near and far came an incessant din. At intervals along the shore sea elephants disported their ungainly masses in the sun-

MACQUARIE I.



Scale: 200 000 or
 1 inch = 3.16 Statute Miles
 Heights in feet
 Depths in fathoms
 Contours every 200 feet



THE HOME OF THE BLIZZARD

light. Circling above us in anxious haste, sea-birds of many varieties gave warning of our near approach to their nests. It was the invasion by man of an exquisite scene of primitive nature.

After the severe weather experienced, the relaxation made us all feel like a band of schoolboys out on a long vacation.

A small sandy beach barred the inlet, and the whale-boat was directed towards it. We were soon grating on the sand amidst an army of Royal penguins; picturesque little fellows, with a crest and eyebrows of long golden-yellow feathers. A few yards from the massed ranks of the penguins was a mottled sea-leopard, which woke up and slid into the sea as we approached.

Several hours were spent examining the neighbourhood. Webb and Kennedy took a set of magnetic observations, while others hoisted some cases of stores on to a rocky knob to form a provision depot, as it was quickly decided that the northern end of the island was likely to be more suitable for a permanent station.

The Royal penguins were almost as petulant as the Adelie penguins which we were to meet further South. They surrounded us, pecked at our legs and chattered with an audacity which defies description. It was discovered that they resented any attempt to drive them into the sea, and it was only after long persuasion that a bevy took to the water. This was a sign of a general capitulation, and some hundreds immediately followed, jostling each other in their haste, squawking, whirring their flippers, splashing and churning the water, reminding one of a crowd of miniature surf-bathers. We followed the files of birds marching inland, along the course of a tumbling stream, until at an elevation of some five hundred feet, on a flattish piece of ground, a huge rookery opened out—acres and acres of birds and eggs.

In one corner of the bay were nests of giant petrels in which sat huge downy young, about the size of a barn-door



Macquarie Island

A GIANT PETREL ON THE NEST

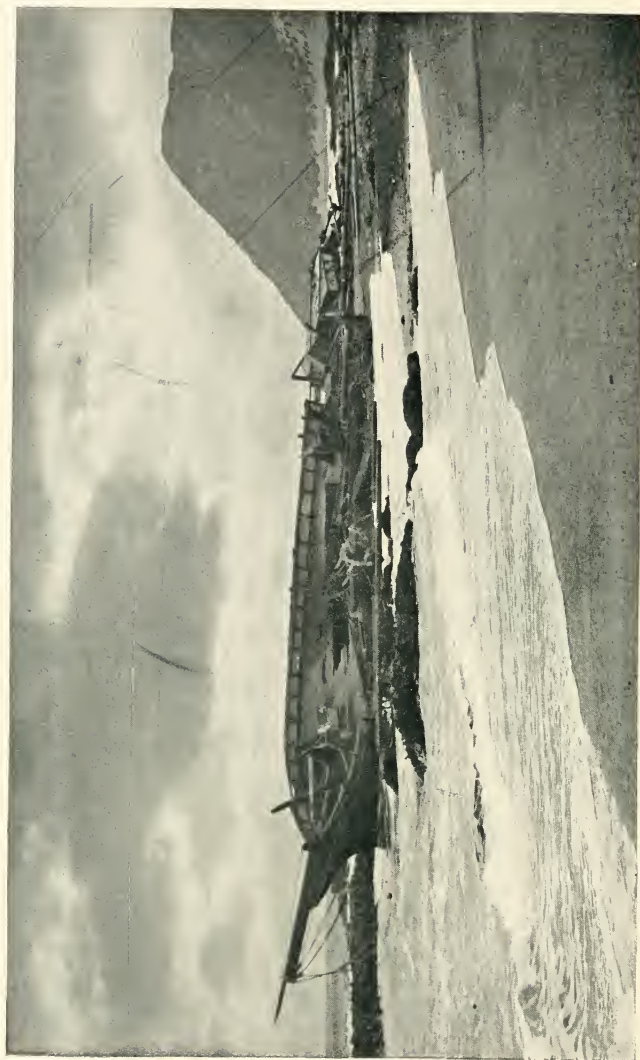
Hamilton



Macquarie Island

A YOUNG GIANT PETREL ON THE NEST. CAROLINE COVE

Marsden



Macquarie Island

THE WRECK OF THE *CLYDE*

THE LAST DAYS AT HOBART

fowl, resembling the grotesque, fluffy toys which might be expected to hang on a Christmas-tree.

Here and there on the beach and on the grass wandered bright-coloured Maori hens. On the south side of the bay, in a low, peaty area overgrown with tussock-grass, were scores of sea elephants, wallowing in bog-holes or sleeping at their ease.

Sea elephants, at one time found in immense numbers on all sub-antarctic islands, are now comparatively rare, even to the degree of extinction, in many of their old haunts. This is the result of ruthless slaughter prosecuted especially by sealers in the early days. At the present time Macquarie Island is more favoured by them than probably any other known locality. The name by which they are popularly known refers to their elephantine proportions and to the fact that, in the case of the old males, the nasal regions are enormously developed, expanding when in a state of excitement to form a short, trunk-like appendage. They have been recorded up to twenty feet in length, and such a specimen would weigh about four tons.

Arriving on the *Aurora* in the evening, we learnt that the ship's company had had an adventure which might have been most serious. It appeared that after dropping us at the entrance to Caroline Cove, the ship was allowed to drift out to sea under the influence of the off-shore wind. When about one-third of a mile north west of the entrance, a violent shock was felt, and she slid over a rock which rose up out of deep water to within about fourteen feet of high-water level; no sign of it appearing on the surface on account of the tranquil state of the sea. Much apprehension was felt for the hull, but as no serious leak started, the escape was considered a fortunate one. A few soundings had been made proving a depth of four hundred fathoms within one and a half miles of the land.

A course was now set for the northern end of the island. Dangerous-looking reefs ran out from many headlands, and cascades of water could be seen falling hundreds of feet from the highlands to the narrow coastal flats.

THE HOME OF THE BLIZZARD

The anchorage most used is that known as North-East Bay, lying on the eastern side of a low spit joining the main mass of the island, to an almost isolated outpost in the form of a flat-topped hill—Wireless Hill—some three-quarters of a mile farther north. It is practically an open roadstead, but, as the prevailing winds blow on to the other side of the island, quiet water can be nearly always expected.

However, when we arrived at North-East Bay on the morning following our adventure, a stiff south-east breeze was blowing, and the wash on the beach put landing out of the question. Captain Davis ran in as near the coast as he could safely venture and dropped anchor, pending the moderation of the wind.

On the leeward slopes of a low ridge, pushing itself out on to the southern extremity of the spit, could be seen two small huts, but no sign of human life. This was not surprising as it was only seven o'clock. Below the huts, upon low surf-covered rocks running out from the beach, lay a small schooner partly broken up and evidently a recent victim. A mile to the southward, fragments of another wreck protruded from the sand.

We were discussing wrecks and the grisly toll which is levied by these dangerous and uncharted shores, when a human figure appeared in front of one of the huts. After surveying us for a moment, he disappeared within to reappear shortly afterwards, followed by a stream of others rushing hither and thither; just as if he had disturbed a hornets' nest. After such an exciting demonstration we awaited the next move with some expectancy.

Planks and barrels were brought on to the beach and a flagstaff was hoisted. Then one of the party mounted on the barrel, and told us by flag signals that the ship on the beach was the *Clyde*, which had recently been wrecked, and that all hands were safely on shore, but requiring assistance. Besides the shipwrecked crew, there were half a dozen men who resided on the island during the summer months for the purpose of collecting blubber.

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The sealers tried repeatedly to come out to us, but as often as it was launched their boat was washed up again on the beach, capsizing them into the water. At length they signalled that a landing could be made on the opposite side of the spit, so the anchor was raised and the ship steamed round the north end of the island, to what Captain Davis proposed should be named Hasselborough Bay, in recognition of the discoverer of the island. This proved an admirable anchorage, for the wind remained from the east and south-east during the greater part of our stay.

The sealers pushed their boat across the spit, and, launching it in calmer water, came out to us, meeting the *Aurora* some three miles off the land. The anchor was let go about one mile and a half from the head of the bay.

News was exchanged with the sealers. It appeared that there had been much speculation as to what sort of a craft we were; visits of ships, other than those sent down specially to convey their oil to New Zealand, being practically unknown. For a while they suspected the *Aurora* of being an alien sealer, and had prepared to defend their rights to the local fishery.

All was well now, however, and information and assistance were freely volunteered. They were greatly relieved to hear that our auxiliary vessel, the *Toroa*, was expected immediately, and would be available for taking the shipwrecked crew back to civilization.

Owing to the loss of the *Clyde*, a large shipment of oil in barrels lay piled upon the beach with every prospect of destruction, just at a time when the realization of its value would be most desirable, to make good the loss sustained by the wreck. I decided, therefore, in view of their hospitality, to make arrangements with the captain of the *Toroa* to take back a load of the oil, upon terms only sufficient to recoup us for the extension of the charter.

In company with Ainsworth, Hannam and others, I went ashore to select a site for the station. As strong westerly winds were to be expected during the greater part

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of the year, it was necessary to erect buildings in the lee of substantial break-winds. Several sites for a hut convenient to a serviceable landing-place were inspected at the north end of the beach. The hut was eventually erected in the lee of a large mass of rock, rising out of the grass-covered sandy flat at the north end of the spit.

It would have been much handier in every way, both in assembling the engines and masts and subsequently in operating the wireless station, had the wireless plant been erected on the beach adjacent to the living-hut. On the other hand, a position on top of the hill had the advantage of a free outlook and of increased electrical potential, allowing of a shorter length of mast. In addition the ground in this situation proved to be peaty and sodden, and therefore a good conductor, thus presenting an excellent "earth" from the wireless standpoint. In short, the advantages of the hill-site outweighed its disadvantages. Of the latter the most obvious was the difficult transportation of the heavy masts, petrol-engine, dynamo, induction-generator and other miscellaneous gear, from the beach to the summit—a vertical height of three hundred feet.

To facilitate this latter work the sealers placed at our disposal a "flying fox" which ran from sea-level to the top of Wireless Hill, and which they had erected for the carriage of blubber. On inspecting it, Wild reported that it was serviceable, but would first require to be strengthened. He immediately set about effecting this with the help of a party.

Hurley now discovered that he had accidentally left one of his cinematograph lenses on a rock where he had been working in Caroline Cove. As it was indispensable, and there was little prospect of the weather allowing of another visit by the ship, it was decided that he should go on a journey overland to recover it. One of the sealers, Hutchinson by name, who had been to Caroline Cove and knew the best route to take, kindly volunteered to accompany Hurley. The party was eventually increased by the addition of

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Harrison, who was to keep a look-out for matters of biological interest. They started off at noon on December 13.

Although the greater part of the stores for the Macquarie Island party were to arrive by the *Toroa* there were a few tons on board the *Aurora*. These and the dogs were landed as quickly as possible. How glad the poor animals were to be once more on solid earth! It was out of the question to let them loose, so they were tethered at intervals along a heavy cable, anchored at both ends amongst the tussock-grass. Ninnis took up his abode in the sealers' hut so that he might the better look after their wants, which centred chiefly on sea elephant meat, and that in large quantities. Webb joined Ninnis, as he intended to take full sets of magnetic observations at several stations in the vicinity.

Bickerton and Gillies got the motor-launch into good working order, and by means of it the rest of us conveyed ashore several tons of coal briquettes, the benzine, kerosene, instruments and the wireless masts, by noon on December 13.

Everything but the requirements of the wireless station was landed on the spit, as near the north-east corner as the surf would allow. Fortunately, reefs ran out from the shore at intervals, and calmer water could be found in their lee. All gear for the wireless station was taken to a spot about half a mile to the north-west at the foot of Wireless Hill, where the "flying fox" was situated. Just at that spot there was a landing-place at the head of a charming little boat harbour, formed by numerous kelp-covered rocky reefs rising at intervals above the level of high water. These broke the swell, so that in most weathers calm water was assured at the landing-place.

This boat harbour was a fascinating spot. The western side was peopled by a rookery of blue-eyed cormorants; scattered nests of white gulls relieved the sombre appearance of the reefs on the opposite side: whilst gentoo penguins in numbers were busy hatching their eggs on the sloping

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ground beyond. Skua-gulls and giant petrels were perched here and there amongst the rocks, watching for an opportunity of marauding the nests of the non-predacious birds. Sea elephants raised their massive, dripping heads in shoal and channel. The dark reefs, running out into the pellucid water, supported a vast growth of a snake-like form of kelp, whose octopus-like tentacles, many yards in length, writhed yellow and brown to the swing of the surge, and gave the foreground an indescribable weirdness. I stood looking out to sea from here one evening, soon after sunset, the launch lazily rolling in the swell, and the *Aurora* in the offing, while the rich tints of the afterglow paled in the south-west.

I envied Wild and his party, whose occupation in connexion with the "flying fox" kept them permanently camped at this spot.

The *Toroa* made her appearance on the afternoon of December 13, and came to anchor about half a mile inside the *Aurora*. Her departure had been delayed by the bad weather. Leaving Hobart late on December 7, she had anchored off Bruny Island awaiting the moderation of the sea. The journey was resumed on the morning of the 9th, and the passage made in fine weather. She proved a handy craft for work of the kind, and Captain Holliman, the master, was well used to the dangers of uncharted coastal waters.

Within a few minutes of her arrival, a five-ton motor-boat of shallow draught was launched and unloading commenced.

Those of the staff arriving by the *Toroa* were housed ashore with the sealers, as, when everybody was on board, the *Aurora* was uncomfortably congested. Fifty sheep were taken on shore to feed on the rank grass until our departure. A large part of the cargo consisted of coal for the *Aurora*. This was already partly bagged, and in that form was loaded into the launches and whale-boats; the former towing the latter to their destination. Thus a continuous stream of coal and stores was passing from ship to ship, and from



Harbour

THE BOAT HARBOUR—HASSELBOROUGH BAY

Macquarie Island



Blicks

THE NORTH END OF MACQUARIE ISLAND SHOWING WIRELESS HILL. THE LIVING-HUT IS AT THE NORTH END OF THE ISTHMUS, WITH NORTH-EAST BAY ON THE RIGHT, AND HASSLEBOROUGH BAY ON THE LEFT SIDE

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the ships to the several landing-places on shore. As soon as the after-hold on the *Toroa* was cleared, barrels of sea elephant oil were brought off in rafts and loaded aft, simultaneously with the unloading forward.

We kept at the work as long as possible—about sixteen hours a day including a short interval for lunch. There were twenty-five of the land party available for general work, and with some assistance from the ship's crew the work went forward at a rapid rate.

On the morning of the 15th, after giving final instructions to Eitel, who had come thus far and was returning as arranged, the *Toroa* weighed anchor and we parted with a cheer.

The transportation of the wireless equipment to the top of the hill had been going on simultaneously with the unloading of the ships. Now, however, all were able to concentrate upon it, and the work went forward very rapidly.

All the wireless instruments, and much of the other paraphernalia of the Macquarie Island party had been packed in the barrels, as it was expected that they would have to be rafted ashore through the surf. Fortunately, the weather continued to "hold" from an easterly direction, and everything was able to be landed in the comparatively calm waters of Hasselborough Bay; a circumstance which the islanders assured us was quite a rare thing. The wireless masts were rafted ashore. These were of oregon pine, each composed of four sections.

Digging the pits for bedding the heavy, wooden "dead men," and erecting the wireless masts, the engine-hut and the operating-hut provided plenty of work for all. Here was as busy a scene as one could witness anywhere—some with the picks and shovels, others with hammers and nails, sailors splicing ropes and fitting masts, and a stream of men hauling the loads up from the sea-shore to their destination on the summit.

Some details of the working of the "flying fox" will be of interest. The distance between the lower and upper terminals was some eight hundred feet. This was spanned

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by two steel-wire carrying cables, secured above by "dead men" sunk in the soil, and below by a turn around a huge rock which outcropped amongst the tussock-grass on the flat, some fifty yards from the head of the boat harbour. For hauling up the loads, a thin wire line, with a pulley-block at either extremity, rolling one on each of the carrying wires, passed round a snatch-block at the upper station. It was of such a length that when the loading end was at the lower station, the counterpoise end was in position to descend at the other. Thus a freight was dispatched to the top of the hill by filling a bag, acting as counterpoise, with earth, until slightly in excess of the weight of the top load; then off it would start gathering speed as it went.

Several devices were developed for arresting the pace as the freight neared the end of its journey, but accidents were always liable to occur if the counterpoise were unduly loaded. Wild was injured by one of these brake-devices, which consisted of a bar of iron lying on the ground about thirty yards in front of the terminus, and attached by a rope with a loose-running noose to the down-carrying wire. On the arrival of the counterpoise at that point on the wire, its speed would be checked owing to the drag exerted. On the occasion referred to, the rope was struck with such velocity that the iron bar was jerked into the air and struck Wild a solid blow on the thigh. Though incapacitated for a few days, he continued to supervise at the lower terminal.

The larger sections of the wireless masts gave the greatest trouble, as they were not only heavy but awkward. A special arrangement was necessary for all loads exceeding one hundredweight, as the single wire carrier-cables were not sufficiently strong. In such cases both carrier-cables were lashed together making a single support, the hauling being done by a straight pull on the top of the hill. The hauling was carried out to the accompaniment of chanties, and these helped to relieve the strain of the work. It was a familiar sight to see a string of twenty men on the hauling-line scaring the skua-gulls with popular choruses like "A'

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roving ” and “ Ho, boys, pull her along.” In calm weather the parties at either terminal could communicate by shouting but were much assisted by megaphones improvised from a pair of leggings.

Considering the heavy weights handled and the speed at which the work was done, we were fortunate in suffering only one breakage, and that might have been more serious than it proved. The mishap in question occurred to the generator. In order to lighten the load, the rotor had been taken out. When almost at the summit of the hill, the ascending weight, causing the carrying-wires to sag unusually low, struck a rock, unhitched the lashing and fell, striking the steep rubble slope, to go bounding in great leaps out amongst the grass to the flat below. Marvellous to relate, it was found to have suffered no damage other than a double fracture of the end-plate casting, which could be repaired. And so it was decided to exchange the generators in the two equipments, as there would be greater facilities for engineering work at the Main Base, Adelie Land. Fortunately, the other generator was almost at the top of the ship's hold, and therefore accessible. The three pieces into which the casting had been broken were found to be sprung, and would not fit together. However, after our arrival at Adelie Land, Hannam found, curiously enough, that the pieces fitted into place perfectly—apparently an effect of contraction due to the cold—and with the aid of a few plates and bolts the generator was made as serviceable as ever.

In the meantime, Hurley, Harrison, and the sealer, Hutchinson, had returned from their trip to Caroline Cove, after a most interesting though arduous journey. They had camped the first evening at The Nuggets, a rocky point on the east coast some four miles to the south of North-East Bay. From The Nuggets, the trail struck inland up the steep hillsides until the summit of the island was reached ; then over pebble-strewn, undulating ground with occasional small lakes, arriving at the west coast near its southern

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extremity. Owing to rain and fog they overshot the mark and had to spend the night close to a bay at the south-end. There Hurley obtained some good photographs of sea elephants and of the penguin rookeries.

The next morning, December 15, they set off again, this time finding Caroline Cove without further difficulty. Harrison remained on the brow of the hill overlooking the cove, and there captured some prions and their eggs. Hurley and his companion found the lost lens and returned to Harrison securing a fine albatross on the way. This solitary bird was descried sitting on the hill side, several hundreds of feet above sea-level. Its plumage was in such good condition that they could not resist the impulse to secure it for our collection, for the moment not considering the enormous weight to be carried. They had neither firearms nor an Ancient Mariner's cross-bow, and no stones were to be had in the vicinity—when the resourceful Hurley suddenly bethought himself of a small tin of meat in his haversack, and, with a fortunate throw, hit the bird on the head, killing the majestic creature on the spot.

Shouldering their prize, they trudged on to Lusitania Bay, camping there that night in an old dilapidated hut; a remnant of the sealing days. Close by there was known to be a large rookery of King penguins; a variety of penguin with richly tinted plumage on the head and shoulders, and next in size to the Emperor—the sovereign bird of the Antarctic Regions. The breeding season was at its height, so Harrison secured and preserved a great number of their eggs. Hutchinson kindly volunteered to carry the albatross in addition to his original load. If they had skinned the bird, the weight would have been materially reduced, but with the meagre appliances at hand, it would undoubtedly have been spoiled as a specimen. Hurley, very ambitiously, had taken a heavy camera, in addition to a blanket and other sundries. During the rough and wet walking of the previous day, his boots had worn out and caused him to twist a tendon in the right foot, so that he was not up to

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his usual form, while Harrison was hampered with a bulky cargo of eggs and specimens.

Saddled with these heavy burdens, the party found the return journey very laborious. Hurley's leg set the pace, and so, later in the day, Harrison decided to push on ahead in order to give us news, as they had orders to be back as soon as possible and were then overdue. When darkness came on, Harrison was near The Nuggets, where he passed the night amongst the tussock-grass. Hurley and Hutchinson, who were five miles behind, also slept by the wayside. When dawn appeared, Harrison moved on, reaching the north-end huts at about 9 A.M. Mertz and Whetter immediately set out and came to the relief of the other two men a few hours later.

Fatigue and the lame leg subdued Hurley for the rest of the day, but the next morning he was off to get pictures of the "flying fox" in action. It was practically impossible for him to walk to the top of the hill, but not to be baffled, he sent the cinematograph machine up by the "flying fox," and then followed himself. Long before reaching the top he realized how much his integrity depended on the strength of the hauling-line and the care of those on Wireless Hill.

During the latter part of our stay at the island, the wind veered to the north and north-north-east. We took advantage of this change to steam round to the east side, intending to increase our supply of fresh water at The Nuggets, where a stream comes down the hillside on to the beach. In this, however, we were disappointed, for the sea was breaking too heavily on the beach, and so we steamed back to North-East Bay and dropped anchor. Wild went off in the launch to search for a landing-place but found the sea everywhere too formidable.

Signals were made to those on shore, instructing them to finish off the work on the wireless plant, and to kill a dozen sheep—enough for our needs for some days.

The ship was now found to be drifting, and, as the wind

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was blowing onshore, the anchor was raised, and with the launch in tow we steamed round to the calmer waters of Hasselborough Bay. At the north end of the island, for several miles out to sea along the line of a submerged reef, the northerly swell was found to be piling up in an ugly manner, and occasioned considerable damage to the launch. This happened as the *Aurora* swung round; a sea catching the launch and rushing it forward so that it struck the stern of the ship bow-on, notwithstanding the fact that several of the men exerted themselves to their utmost to prevent a collision. On arrival at the anchorage, the launch was noticeably settling down, as water had entered at several seams which had been started.

After being partly bailed out, it was left in the water with Hodgeman and Close aboard, as we wished to run ashore as soon as the weather improved. Contrary to expectation the wind increased, and it was discovered that the *Aurora* was drifting rapidly, although ninety fathoms of chain had been paid out. Before a steam-winch* was installed, the anchor could be raised only by means of an antiquated man-power lever-windlass. In this type, a see-saw-like lever is worked by a gang of men at each extremity, and it takes a long time to get in any considerable length of chain. The chorus and chanty came to our aid once more, and the long hours of heaving on the fo'c'sle head were a bright if strenuous spot in our memories of Macquarie Island. In course of time, during which the ship steamed slowly ahead, the end came in sight—'Vast heaving!—but the anchor was missing. This put us in an awkward situation, for the stock of our other heavy anchor had already been lost. There was no other course but to steam up and down waiting for the weather to moderate. In the meantime, we had all been too busy to relieve Close and Hodgeman, who had been doing duty in the launch, bailing for five hours, and were thoroughly soaked with

* Fitted on return of the vessel to Sydney after the first Antarctic cruise.



Macquarie Island

Hurley

THE *AFRORA* ANCHORED IN HASSLEBOROUGH BAY. IN THE FOREGROUND GIANT SEAWEED IS SWINGING IN THE WASH OF THE SURGE



A WANDERER ALBATROSS AT REST ON THE WATER

Marson



HUNTER TICKLES A SLEEPING BABY SEA-ELEPHANT

Hudley

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spray. All hands now helped with the tackle, and we soon had the launch on board in its old position near the main hatch.

These operations were unusually protracted for we were short handed ; the boatswain, some of the sailors and most of the land party being marooned on shore. We were now anxious to get everybody on board and to be off. The completion of their quarters was to be left to the Macquarie Island party, and it was important that we should make the most of the southern season. The wind blew so strongly, however, that there was no immediate prospect of departure.

The ship continued to steam up and down. On the morning of December 23 it was found possible to lower the whale-boat, and Wild went off with a complement of sturdy oarsmen, including Madigan, Moyes, Watson and Kennedy, and succeeded in bringing off the dogs. Several trips were made with difficulty during the day, but at last all the men, dogs and sheep were brought off.

Both Wild and I went with the whale-boat on its last trip at dusk on the evening of December 23. The only possible landing-place, with the sea then running, was at the extreme north-eastern corner of the beach. No time was lost in getting the men and the remainder of the cargo into the boat, though in the darkness this was not easily managed. The final parting with our Macquarie Island party took place on the beach, their cheers echoing to ours as we breasted the surf and "gave way" for the ship.

CHAPTER III

FROM MACQUARIE ISLAND TO ADELIE LAND

THE morning following our farewell to Ainsworth and party at the north end of the island found us steaming down the west coast, southward bound.

Our supply of fresh water was scanty, and the only resource was to touch at Caroline Cove. As a matter of fact, there were several suitable localities on the east coast, but the strong easterly weather then prevailing made a landing impossible.

On the ship nearing the south end, the wind subsided. She then crept into the lee of the cliffs, a boat was dropped and soundings disclosed a deep passage at the mouth of Caroline Cove and ample water within. There was, however, limited space for manœuvring the vessel if a change should occur in the direction of the wind. The risk was taken; the *Aurora* felt her way in, and, to provide against accident, was anchored by Captain Davis with her bow towards the entrance. Wild then ran out a kedge anchor to secure the stern.

During the cruise down the coast the missing stock of our only remaining anchor had been replaced by Gillies and Hannam. Two oregon "dead men," bolted together on the shank, made a clumsy but efficient makeshift.

Two large barrels were taken ashore, repeatedly filled and towed off to the ship. It was difficult at first to find good water, for the main stream flowing down from the head of the bay was contaminated by the penguins which made it their highway to a rookery. After a search, an almost dry gully was found to yield water when a pit was dug in its bed. This spot was some eighty yards from the beach,

FROM MACQUARIE ISLAND TO ADELIE LAND

and to reach it one traversed an area of tussocks between which sea elephants wallowed in soft mire.

A cordon of men was made and buckets were interchanged, the full ones descending and the empty ones ascending. The barrels on the beach were thus speedily filled and taken off by a boat's crew. At 11 P.M. darkness came, and it was decided to complete the work on the following day.

As we rowed to the ship, the water was serenely placid. From the dark environing hills came the weird cries of strange birds. There was a hint of wildness, soon to be forgotten in the chorus of a 'Varsity song and the hearty shouts of the rowers.

About 2 A.M. the officer on watch came down to report to Captain Davis a slight change in the direction of the breeze. At 3 A.M. I was again awakened by hearing Captain Davis hasten on deck, and by a gentle bumping of the ship, undoubtedly against rock. It appeared that the officer on watch had left the bridge for a few minutes, while the wind freshened and was blowing at the time nearly broadside-on from the north. This caused the ship to sag to leeward, stretching the bow and stern cables, until she came in contact with the kelp-covered, steep, rocky bank on the south side. The narrow limits of the anchorage were responsible for this dangerous situation.

All hands were immediately called on deck and set to work hauling on the stern cable. In a few minutes the propeller and rudder were out of danger. The engines were then started slowly ahead, and, as we came up to the bower anchor, the cable was taken in. The wind was blowing across the narrow entrance to the Cove, so that it was advisable to get quickly under way. The kedge anchor was abandoned, and we steamed straight out to sea with the bower hanging below the bows. The wind increased, and there was no other course open but to continue the southward voyage.

THE HOME OF THE BLIZZARD

The day so inauspiciously begun turned out beautifully sunny. There was additional verve in our Christmas celebration, as Macquarie Island and the Bishop and Clerk, in turn, sank below the northern horizon.

During the stay at the island little attention had been given to scientific matters. All our energies had been concentrated on speedily landing the party which was to carry out such special work, so as to allow us to get away south as soon as possible. Enough had been seen to indicate the wide scientific possibilities of the place.

For some days we were favoured by exceptional weather; a moderate breeze from the north-east and a long, lazy swell combining to make our progress rapid.

The sum of the experiences of earlier expeditions had shown that the prevailing winds south of 60° S. latitude were mainly south-easterly, causing a continuous streaming of the pack from east to west. Our obvious expedient on encountering the ice was to steam in the same direction as this drift. It had been decided before setting out that we would confine ourselves to the region west of the meridian of 158° E. longitude. So it was intended to reach the pack, approximately in that meridian, and, should we be repulsed, to work steadily to the west in expectation of breaking through to the land.

Regarding the ice conditions over the whole segment of the unknown tract upon which our attack was directed, very little was known. Critically examined, the reports of the American squadron under the command of Wilkes were highly discouraging. D'Urville appeared to have reached his landfall without much hindrance by ice, but that was a fortunate circumstance in view of the difficulties Wilkes had met. At the western limit of the area we were to explore, the Germans in the *Gauss* had been irrevocably trapped in the ice as early as the month of February. At the eastern limit, only the year before, the *Terra Nova* of Scott's expedition, making a sally into unexplored waters, had sighted new land almost

FROM MACQUARIE ISLAND TO ADELIE LAND

on the 158th meridian, but even though it was then the end of summer, and the sea was almost free from the previous season's ice, they were not able to reach the land on account of the dense pack.

In the early southern summer, at the time of our arrival, the ice conditions were expected to be at their worst. This followed from the fact that not only would local floes be encountered, but also a vast expanse of pack fed by the disintegrating floes of the Ross Sea, since, between Cape Adare and the Balleny Islands, the ice drifting to the north-west under the influence of the south-east winds is arrested in an extensive sheet. On the other hand, were we to wait for the later season, no time would remain for the accomplishment of the programme which had been arranged. So we were forced to accept things as we found them, being also prepared to make the most of any chance opportunity.

In planning the Expedition, the probability of meeting unusually heavy pack had been borne in mind, and the three units into which the land parties and equipment were divided had been disposed so as to facilitate the landing of a base with despatch, and, maybe, under difficult circumstances. Further, in case the ship were frozen in, "wireless" could be installed and the news immediately communicated through Macquarie Island to Australia.

At noon on December 27 whales were spouting all round us, and appeared to be travelling from west to east. Albatrosses of several species constantly hovered about, and swallow-like Wilson petrels—those nervous rangers of the high seas—would sail along the troughs and flit over the crests of the waves, to vanish into sombre distance.

Already we were steaming through untravelled waters, and new discoveries might be expected at any moment. A keen interest spread throughout the ship. On several occasions, fantastic clouds on the horizon gave hope of land, only to be abandoned on further advance. On December 28 and 29 large masses of floating kelp were seen, and, like the

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flotsam met with by Columbus, still further raised our hopes.

The possibility of undiscovered islands existing in the Southern Ocean, south of Australia and outside the ice-bound region, kept us vigilant. So few ships had ever navigated the waters south of latitude 55° , that some one and a quarter million square miles lay open to exploration. As an instance of such a discovery in the seas south of New Zealand may be mentioned Scott Island, first observed by the *Morning*, one of the relief ships of the British Expedition of 1902.

The weather remained favourable for sounding and other oceanographical work, but as it was uncertain how long these conditions would last, and in view of the anxiety arising from overloaded decks and the probability of gales which are chronic in these latitudes, it was resolved to land one of the bases as soon as possible, and thus rid the ship of superfluous cargo. The interesting but time-absorbing study of the ocean-depths was therefore postponed for a while.

With regard to the Antarctic land to be expected ahead, many of Wilkes's landfalls, where they had been investigated by later expeditions, had been disproved. It seemed as if he had regarded the northern margin of the solid floe and shelf-ice as land; perhaps also mistaking bergs, frozen in the floe and distorted by mirage, for ice-covered land. Nevertheless, his soundings, and the light thrown upon the subject by the Scott and Shackleton expeditions, left no doubt in my mind that land would be found within a reasonable distance south of the position assigned by Wilkes. Some authorities had held that any land existing in this region would be found to be of the nature of isolated islands. Those familiar with the adjacent land, however, were all in favour of it being continental—a continuation of the Victoria Land plateau. The land lay to the south beyond doubt; the problem was to reach it through the belt of ice-bound sea. Still, navigable pack-ice might be ahead, obviating the need of driving too far to the west.

A WEATHER-WORN SNOW-BERG

A GROTTODE ICEBERG

From crayon drawings by Van Waterschoot van der Gracht



FROM MACQUARIE ISLAND TO ADELIE LAND

“Ice on the starboard bow!” At 4 P.M. on December 29 the cry was raised, and shortly after we passed alongside a small caverned berg whose bluish-green tints called forth general admiration. In the distance others could be seen. One larger than the average stood almost in our path. It was of the flat-topped, sheer-walled type, so characteristic of the Antarctic regions; three-quarters of a mile long and half a mile wide, rising eighty feet above the sea.

It has been stated that tabular bergs are typical of the Antarctic as opposed to the Arctic. This diversity is explained by a difference in the glacial conditions. In the north, glaciation is not so marked and, as a rule, coastal areas are free from ice, except for valley-glaciers which transport ice from the high interior down to sea-level. There, the summer temperature is so warm that the lower parts of the glaciers become much decayed, and, reaching the sea, break up readily into numerous irregular, pinnacled bergs of clear ice. In the south, the tabular forms result from the fact that the average annual temperature is colder than that prevailing at the northern axis of the earth. They are so formed because, even at sea-level, no appreciable amount of thawing takes place in midsummer. The inland ice pushes out to sea in enormous masses, and remains floating long before it “calves” to form bergs. Even though its surface has been thrown into ridges as it was creeping over the uneven land, all are reduced to a dead level or slightly undulating plain, in the free-floating condition, and are still further effaced by dense drifts and repeated falls of snow descending upon them. The upper portion of a table-topped berg consists, therefore, of consolidated snow; neither temperature nor pressure having been sufficient to metamorphose it into clear ice. Such a berg in old age becomes worn into an irregular shape by the action of waves and weather, and often completely capsizes, exposing its corroded basement.

A light fog obscured the surrounding sea and distant

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bergs glided by like spectres. A monstrous block on the starboard side had not been long adrift, for it showed but slight signs of weathering.

The fog thickened over a grey swell that shimmered with an oily lustre. At 7 P.M. pack-ice came suddenly to view, and towards it we steered, vainly peering through the mists ahead in search of a passage. The ice was closely packed, the pieces being small and well worn. On the out-skirts was a light brash which steadily gave place to a heavier variety, composed of larger and more angular fragments. A swishing murmur like the wind in the tree-tops came from the great expanse. It was alabaster-white and through the small, separate chips was diffused a pale lilac coloration. The larger chunks, by their motion and exposure to wind and current, had a circle of clear water; the deep sea-blue hovering round their water-worn niches. Here and there appeared the ochreous-yellow colour of adhering films of diatoms.

As we could not see what lay beyond, and the pack was becoming heavier, the ship was swung round and headed out.

Steering to the west through open water and patches of trailing brash, we were encouraged to find the pack trending towards the south. By pushing through bars of jammed floes and dodging numerous bergs, twenty miles were gained due southwards before the conditions had changed. The fog cleared, and right ahead massive bergs rose out of an ice-strewn sea. We neared one which was a mile in length and one hundred feet in height. The heaving ocean, dashing against its mighty, glistening walls, rushed with a hollow boom into caverns of ethereal blue; gothic portals to a cathedral of resplendent purity.

The smaller bergs and fragments of floe crowded closer together, and the two men at the wheel had little time for reverie. Orders came in quick succession—"Starboard! Steady!" and in a flash—"Hard-a-port!" Then repeated all over again, while the rudder-chains scraped and rattled in their channels.

Gradually the swell subsided, smoothed by the weight



A TYPICAL TABLE-TOPPED NEVÉ BERG ORIGINATING
FROM FLOATING SHELF-ICE

Hurley



AN ANTARCTIC ICEBERG WITH A RETICULATION OF CREVASSES ON ITS TILTED
SURFACE. THIS BERG HAD NO DOUBT TAKEN ITS ORIGIN FROM THE ICE OF
THE COASTAL CLIFFS OF ADELIE LAND

Hurley



IN PACK-ICE

Harley

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of ice. The tranquillity of the water heightened the superb effects of this glacial world. Majestic tabular bergs whose crevices exhaled a vaporous azure; lofty spires, radiant turrets and splendid castles; honeycombed masses illumined by pale green light within whose fairy labyrinths the water washed and gurgled. Seals and penguins on magic gondolas were the silent denizens of this dreamy Venice. In the soft glamour of the midsummer midnight sun, we were possessed by a rapturous wonder—the rare thrill of unreality.

The ice closed in, and shock after shock made the ship vibrate as she struck the smaller pieces full and fair, followed by a crunching and grinding as they scraped past the sides. The dense pack had come, and hardly a square foot of space showed amongst the blocks; smaller ones packing in between the larger, until the sea was covered with a continuous armour of ice. The ominous sound arising from thousands of faces rubbing together as they gently oscillated in the swell was impressive. It spoke of a force all-powerful, in whose grip puny ships might be locked for years and the less fortunate receive their last embrace.

The pack grew heavier and the bergs more numerous, embattled in a formidable array. If an ideal picture, from our point of view it was impenetrable. No “water sky” showed as a distant beacon; over all was reflected the pitiless, white glare of the ice. The *Aurora* retreated to the open sea, and headed to the west in search of a break in the ice-front. The wind blew from the south-east, and, with sails set to assist the engines, rapid progress was made.

The southern prospect was disappointing, for the heavy pack was ranged in a continuous bar. The over-arching sky invariably shone with that yellowish-white effulgence known as “ice blink,” indicative of continuous ice, in contrast with the dark water sky, a sign of open water, or a mottled sky proceeding from an ice-strewn but navigable sea.

Though progress can be made in dense pack, provided

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it is not too heavy, advance is necessarily very slow—a few miles a day, and that at the expense of much coal. Without a well-defined “water sky” it would have been foolish to have entered. Further, everything pointed to heavier ice-conditions in the south, and, indeed, in several places we reconnoitred, and such was proved to be the case. Large bergs were numerous, which, on account of being almost unaffected by surface currents because of their ponderous bulk and stupendous draught, helped to compact the shallow surface-ice under the free influence of currents and winds. In our westerly course we were sometimes able to edge a little to the south, but were always reduced to our old position within a few hours. Long projecting “tongues” were met at intervals and, when narrow or open, we pushed through them.

Whales were frequently seen, both rorquals and killers. On the pack, sea-leopards and crab-eater seals sometimes appeared. At one time as many as a hundred would be counted from the bridge and at other moments not a single one could be sighted. They were not alarmed, unless the ship happened to bump against ice-masses within a short distance of them. A small sea-leopard, shot from the fo’c’sle by a well-directed bullet from Wild, was taken on board as a specimen; the meat serving as a great treat for the dogs.

On January 2, when driving through a tongue of pack, a halt was made to “ice ship.” A number of men scrambled over the side on to a large piece of floe and handed up the ice. It was soon discovered, however, that the swell was too great, for masses of ice ten tons or more in weight swayed about under the stern, endangering the propeller and rudder—the vulnerable parts of the vessel. So we moved on, having secured enough fresh-water ice to supply a pleasant change after the somewhat discoloured tank-water then being served out. The ice still remained compact and forbidding, but each day we hoped to discover a weak spot through which we might probe to the land itself.

FROM MACQUARIE ISLAND TO ADELIE LAND

On the evening of January 2 we saw a high, pinnacled berg, a few miles within the edge of the pack, closely resembling a rocky peak; the transparent ice of which it was composed appeared, in the dull light, of a much darker hue than the surrounding bergs. Another adjacent block exhibited a large black patch on its northern face, the exact nature of which could not be ascertained at a distance. Examples of rock debris embedded in bergs had already been observed, and it was presumed that this was a similar case. These were all hopeful signs, for the earthy matter must, of course, have been picked up by the ice during its repose upon some adjacent land.

At this same spot, large flocks of silver-grey petrels were seen resting on the ice and skimming the water in search of food. As soon as we had entered the ice-zone, most of our old companions, such as the albatross, had deserted, while a new suite of Antarctic birds had taken their place. These included the beautiful snow petrel, the Antarctic petrel, and the small, lissome Wilson petrel—a link with the bird-life of more temperate seas.

On the evening of January 3 the wind was blowing fresh from the south-east and falling snow obscured the horizon. The pack took a decided turn to the north, which fact was particularly disappointing in view of the distance we had already traversed to the west. We were now approaching the longitude of D'Urville's landfall, and still the pack showed no signs of slackening. I was beginning to feel very anxious, and had decided not to pass that longitude without resorting to desperate measures.

The change in our fortunes occurred at five o'clock next morning, when the Chief Officer, Toucher, came down from the bridge to report that the atmosphere was clearing and that there appeared to be land-ice near by. Sure enough, on the port side, within a quarter of a mile, rose a massive barrier of ice extending far into the mist and separated from the ship by a little loose pack-ice. The problem to be solved was, whether it was the seaward face

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of an ice-covered continent, the ice-capping of a low island or only a flat-topped iceberg of immense proportions.

By 7 A.M. a corner was reached where the ice-wall trended southward, limned on the horizon in a series of bays and headlands. An El Dorado had opened before us, for the winds coming from the east of south had cleared the pack away from the lee of the ice-wall, so that in the distance a comparatively clear sea was visible, closed by a bar of ice, a few miles in extent. Into this we steered, hugging the ice-wall, and were soon in the open, speeding along in glorious sunshine, bringing new sights into view every moment.

The wall, along the northern face, was low—from thirty to seventy feet in height—but the face along which we were now progressing gradually rose in altitude to the south. It was obviously a shelf-ice formation (or a glacier-tongue projection of it), exactly similar in build, for instance, to the Great Ross Barrier so well described by Ross, Scott, and others. At the north-west corner, at half a dozen places within a few miles of each other, the wall was puckered up and surmounted by semi-conical eminences, half as high as the face itself. These peculiar elevations were unlike anything previously recorded and remained unexplained for a while, until closer inspection showed them to be the result of impact with other ice-masses—a curious but conceivable cause.

On pieces of broken floe Weddell seals were noted. They were the first seen on the voyage and a sure indication of land, for their habitat ranges over the coastal waters of Antarctic lands.

A large, low, dome-topped elevation, about one mile in diameter, was passed on the starboard side, at a distance of two miles from the long ice-cliff. This corresponded in shape with what Ross frequently referred to as an "ice island," uncertain whether it was a berg or ice-covered land. A sounding close by gave two hundred and eight





A GLIMPSE FROM WITHIN THE CAVERN SHOWN IN THE
PRECEDING ILLUSTRATION

Hurley

FROM MACQUARIE ISLAND TO ADELIE LAND

fathoms, showing that we were on the continental shelf, and increasing the probability that the "ice island" was aground.

Birds innumerable appeared on every hand: snow petrels, silver petrels, Cape pigeons and Antarctic petrels. They fluttered in hundreds about our bows. Cape pigeons are well known in lower latitudes, and it was interesting to find them so far south. As they have chessboard-like markings on the back when seen in flight, there is no mistaking them.

The ice-wall or glacier-tongue now took a turn to the south-east. At this point it had risen to a great height, about two hundred feet sheer. A fresh wind was blowing in our teeth from the south-south-east, and beyond this point would be driving us on to the cliffs. We put the ship about, therefore, and made for the lee side of the "ice island."

In isolated coveys on the inclined top of the "island" were several flocks, each containing hundreds of Antarctic petrels. At intervals they would rise into the air in clouds, shortly afterwards to settle down again on the snow.

Captain Davis moved the ship carefully against the lee wall of the "island," with a view of replenishing our water-supply, but it was unscalable, and we were forced to withdraw. Crouched on a small projection near the water's edge was a seal, trying to evade the eyes of a dozen large grampuses which were playing about near our stern. These monsters appeared to be about twenty-five feet in length. They are the most formidable predacious mammals of the Antarctic seas, and annually account for large numbers of seals, penguins, and other cetaceans. The sea-leopard is its competitor, though not nearly so ferocious as the grampus, of whom it lives in terror.

The midnight hours were spent off the "ice island" while we waited for a decrease in the wind. Bars of cirrus clouds covered the whole sky—the presage of a coming storm. The wind arose, and distant objects were blotted out by driving snow. An attempt was made to keep the ship in shelter by steaming into the wind, but as "ice island" and

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glacier-tongue were lost in clouds of snow, we were fortunate to make the lee of the latter, about fourteen miles to the north. There we steamed up and down until the afternoon of January 5, when the weather improved. A sounding was taken and the course was once more set for the south.

The sky remained overcast, the atmosphere foggy, and a south-south-east wind was blowing as we came abreast of the "ice island," which, by the way, was discovered to have drifted several miles to the north, thus proving itself to be a free-floating berg. The glacier-tongue on the port side took a sharp turn to the east-south-east, disappearing on the horizon. As there was no pack in sight and the water was merely littered with fragments of ice, it appeared most likely that the turn in the glacier-tongue was part of a great sweeping curve ultimately joining with the southward land. On our south-south-east course we soon lost sight of the ice-cliffs in a gathering fog.

On the afternoon of January 6 the wind abated and the fog began to clear. At 5 P.M. a line of ice confronted us and, an hour later, the *Aurora* was in calm water under another mighty ice face trending across our course. This wall was precisely similar to the one seen on the previous evening, and might well have been a continuation of it. It is scarcely credible that when the *Aurora* came south the following year, the glacier-tongue first discovered had entirely disappeared. It was apparently nothing more than a huge iceberg measuring forty miles in length. Specially valuable, as clearing up any doubt that may have remained, was its re-discovery the following year some fifty miles to the north-west. Close to the face of the new ice-wall, which proved to be a true glacier-tongue, a mud bottom was found at a depth of three hundred and ninety-five fathoms.

While we were steaming in calm water to the south-west, the massive front, serrated by shallow bays and capes, passed in magnificent review. Its height attained a maximum of one hundred and fifty feet. In places the sea had eaten out enormous blue grottoes. At one spot, several of these had

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broken into each other to form a huge domed cavern, the roof of which hung one hundred feet above the sea. The noble portico was flanked by giant pillars.

The glacier-tongue bore all the characters of shelf-ice, by which is meant a floating extension of the land-ice.* A table-topped berg in the act of formation was seen, separated from the parent body of shelf-ice by a deep fissure several yards in width.

At 11 P.M. the *Aurora* entered a bay, ten miles wide, bounded on the east by the shelf-ice wall and on the west by a steep snow-covered promontory rising approximately two thousand feet in height, as yet seen dimly in hazy outline through the mist. No rock was visible, but the contour of the ridge was clearly that of ice-capped land.

There was much jubilation among the watchers on deck at the prospect. Every available field-glass and telescope was brought to bear upon it. It was almost certainly the Antarctic continent, though, at that time, its extension to the east, west and south remained to be proved. The shelf-ice was seen to be securely attached to it and, near its point of junction with the undulating land-ice, we beheld the mountains of this mysterious land haloed in ghostly mist.

While passing the extremity of the western promontory, we observed an exposure of rock, jutting out of the ice near sea-level, in the face of a scar left by an avalanche. Later, when passing within half a cable's length of several berg-like masses of ice lying off the coast, rock was again visible in black relief against the water's edge, forming a pedestal for the ice. The ship was kept farther offshore, after this warning, for though she was designed to buffet with the ice, we had no desire to test her resistance to rock.

The bottom was very irregular, and as an extra precaution, soundings were taken every few minutes. Through

* Subsequently this shelf-ice formation was found to be a floating glacier-tongue sixty miles in length, the seaward extension of a large glacier which we named the Mertz Glacier.

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a light fog all that could be seen landwards was a steep, sloping, icy surface descending from the interior, and terminating abruptly in a seaward cliff fifty to two hundred feet in height.

The ice-sheet terminating in this wall presented a more broken surface than the floating shelf-ice. It was riven and distorted by gaping crevasses; an indication of the rough bed over which it had travelled.

Towards midnight another bay was entered and many rocky islets appeared on its western side. The engines were stopped for a few hours, and the voyage was resumed in clearer weather on the following morning.

All day we threaded our way between islands and bergs. Seals and penguins swam around, the latter squawking and diving in a most amusing manner.

Cautiously we glided by an iceberg, at least one hundred and fifty feet high, rising with a faceted, perpendicular face chased with soft, snowy traceries and ornamented with stalactites. Splits and rents broke into the margin, and from each streamed the evanescent, azure vapour. Each puncture and tiny grotto was filled with it, and a sloping cap of shimmering snow spread over the summit. The profile-view was an exact replica of a battleship, grounded astern. The bold contour of the bow was perfect, and the massive flank had been torn and shattered by shell-fire in a desperate naval battle. This berg had heeled over considerably, and the original water-line ran as a definite rim, thirty feet above the green water. From this rim shelved down a smooth and polished base, marked with fine vertical striæ.

Soundings varied from twenty to two hundred fathoms, and, accordingly, the navigation was particularly anxious work.

Extending along about fifteen miles of coast, where the inland ice came down steeply to the sea, was a marginal belt of sea, about two or three miles in width, thickly strewn with rocky islets. Of these some were flat and others peaked,

THE MERTZ GLACIER-TONGUE, AT A POINT 50 MILES FROM THE LAND
Adelie Land . . . *Paget colour photo by Correll*



FROM MACQUARIE ISLAND TO ADELIE LAND

but all were thickly populated by penguins, petrels and seals. The rocks appeared all to be gneisses and schists.

Later that night we lay off a possible landing-place for one of our bases, but, on more closely inspecting it in the morning, we decided to proceed farther west into a wide sweeping bay which opened ahead. About fifty miles ahead, on the far side of Commonwealth Bay, as we named it, was a cape which roughly represented in position Cape Découverte, the most easterly extension of Adelie Land seen by D'Urville in 1840. Though Commonwealth Bay and the land already seen had never before been sighted, all was placed under the territorial name of Adelie Land.

The land was so overwhelmed with ice that, even at sea-level, the rock was all but entirely hidden. Here was an ice age in all earnestness ; a picture of Northern Europe during the Great Ice Age some fifty thousand years ago. It was evident that the glaciation of Adelie Land was much more severe than that in higher Antarctic latitudes, as exemplified on the borders of the Ross Sea ; the arena of Scott's, Shackleton's and other expeditions. The temperature could not be colder, so we were led to surmise that the snowfall must be excessive. The full truth was to be ascertained by bitter experience, after spending a year on the spot.

I had hoped to find the Antarctic continent in these latitudes bounded by a rocky and attractive coast like that in the vicinity of Cape Adare ; the nearest well-explored region. It had proved otherwise, only too well endorsing the scanty information supplied by D'Urville and Wilkes of the coastline seen by them. A glance at the austere plateau and the ice-fettered coast was evidence of a rigid, inhospitable climate. It was apparent, too, that only a short summer could be expected in these latitudes, thus placing limitations upon our operations.

If three bases were to be landed it was important that they should be spread at sufficiently wide intervals. If one were placed in Adelie Land, the ship would probably have to break through the pack in establishing each of the

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other two bases. Judging by our previous experience there was no certain prospect of this being effected. The successful landing of three bases in suitable positions, sufficiently far apart for advantageous co-operation in geographical, meteorological and other observations, had now become problematical. In addition, one of the parties was not as strong as I would have liked, considering what would be undoubtedly its strenuous future.

For some days the various phases of the situation had occupied my mind, and I now determined to risk two bases, combining the smallest of the three parties with the Main Base. Alterations in the personnel of the third party were also made, by which the Main Base would be increased in strength for scientific work, and the other party under the leadership of Wild would be composed of men of specially good sledging calibre, besides being representative of the leading branches of our scientific programme.

We had a splendid lot of men, and I had no difficulty in choosing for Wild seven companions who could be relied upon to give a good account of themselves. It was only by assuring myself of their high efficiency that I could expect to rest from undue anxiety throughout the year of our separation. The composition of the two parties was as follows :

Main Base : R. Bage, F. H. Bickerton, J. H. Close, P. E. Correll, W. H. Hannam, A. J. Hodgeman, J. G. Hunter, J. F. Hurley, C. F. Laseron, C. T. Madigan, A. L. McLean, X. Mertz, H. D. Murphy, B. E. S. Ninnis, F. L. Stillwell, E. N. Webb, L. H. Whetter and myself.

Western Party : G. Dovers, C. T. Harrison, C. A. Hoadley, S. E. Jones, A. L. Kennedy, M. H. Moyes, A. D. Watson, and F. Wild (leader).

I was now anxious to find a suitable location for our Main Base; two reasons making it an urgent matter. The first was, that as we advanced to the west we were leaving the South Magnetic Pole, and I was anxious to have our magnetographs running as near the latter as possible. Secondly, we would be daily increasing our distance from



THE *AURORA* IN COMMONWEALTH BAY; THE RISING PLATEAU OF ADELIE LAND IN THE DISTANCE

Hurley



Adelie Land

THE INVALUABLE MOTOR-LAUNCH; LEFT TO RIGHT,
HAMILTON, BICKERTON AND BLAKE

Harley



Adelie Land

THE WHALE-BOAT WITH PASSENGERS FOR THE
SHORE; WILD AT THE STEERING OAR

Gray

FROM MACQUARIE ISLAND TO ADELIE LAND

Macquarie Island, making wireless communication more uncertain.

At noon on January 8, while I was weighing the pros and cons with Captain Davis, Wild came in to say that there was a rocky exposure about fifteen miles off on the port side, and suggested altering our course to obtain a better view of it.

Just after 4 P.M., when the ship was about one mile from the nearest rocks, the whale-boat was lowered and manned. We rowed in with the object of making a closer investigation. From the ship's deck, even when within a mile, the outcrop had appeared to project directly from under the inland ice-sheet. Now, however, we were surprised to find ourselves amongst an archipelago of islets. These were named the Mackellar Islets, in remembrance of one who had proved a staunch friend of the Expedition.

Weddell seals and Adelie penguins in thousands rested upon the rocks; the latter chiefly congregated upon a long, low, bare islet situated in the centre. This was the largest of the group, measuring about half a mile in length; others were not above twenty yards in diameter. As we came inshore, the main body of the archipelago was found to be separated by a mile and a half from the mainland. A point which struck us at the time was that the islets situated on the southern side of the group were capped by unique masses of ice; resembling iced cakes. Later we were able to see them in process of formation. In the violent southerly hurricanes prevalent in Adelie Land, the spray breaks right over them. Part of it is deposited and frozen, and by increments the icing of these monstrous "cakes" is built up. The amount contributed in winter makes up for loss by thawing in midsummer. As the islets to windward shelter those in their lee, the latter are destitute of these natural canopies.

Soundings were taken at frequent intervals with a hand lead-line, manipulated by Madigan. The water was on the whole shallow, varying from a few to twenty fathoms.

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The bottom was clothed by dense, luxuriant seaweed. This rank growth along the littoral was unexpected, for nothing of the kind exists on the Ross Sea coasts within five or six fathoms of the surface.

Advancing towards the mainland, we observed a small islet amongst the rocks, and towards it the boat was directed. We were soon inside a beautiful, miniature harbour completely land-locked. The sun shone gloriously in a blue sky as we stepped ashore on a charming ice-quay—the first to set foot on the Antarctic continent between Cape Adare and Gaussberg, a distance of one thousand eight hundred miles.

Wild and I proceeded to make a tour of exploration. The rocky area at Cape Denison, as it was named, was found to be about one mile in length and half a mile in extreme width. Behind it rose the inland ice, ascending in a regular slope and apparently free of crevasses—an outlet for our sledging parties in the event of the sea not firmly freezing over. To right and left of this oasis, as the visitor to Adelie Land must regard the welcome rock, the ice was heavily crevassed and fell sheer to the sea in cliffs, sixty to one hundred and fifty feet in height. Two small dark patches in the distance were the only evidences of rock to relieve the white monotony of the coast.

In landing cargo on Antarctic shores, advantage is generally taken of the floe-ice on to which the materials can be unloaded and at once sledged away to their destination. Here, on the other hand, there was open water, too shallow for the *Aurora* to be moored alongside the ice-foot. The only alternative was to anchor the ship at a distance and discharge the cargo by boats running to the ideal harbour we had discovered. Close to the boat harbour was suitable ground for the erection of a hut, so that the various impedimenta would have to be carried only a short distance. For supplies of fresh meat, in the emergency of being marooned for a number of years, there were many Weddell seals at hand, and on almost all the neighbouring ridges colonies of penguins were busy rearing their young.

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As a station for scientific investigations, it offered a wider field than the casual observer would have imagined. So it came about that the Main Base was finally settled at Cape Denison, Commonwealth Bay.

We arrived on board at 8 P.M., taking a seal as food for the dogs. Without delay, the motor-launch was dropped into the water, and both it and the whale-boat loaded with frozen carcasses of mutton, cases of eggs and other perishable goods.

While some of us went ashore in the motor-launch, with the whale-boat in tow, the *Aurora* steamed round the Mackellar Islets seeking for a good anchorage under the icy barrier, immediately to the west of the boat harbour. The day had been perfect, vibrant with summer and life, but towards evening a chill breeze sprang up, and we in the motor-launch had to beat against it. By the time we had reached the head of the harbour, Hoadley had several fingers frost-bitten and all were feeling the cold, for we were wearing light garments in anticipation of fine weather. The wind strengthened every minute, and showers of fine snow were soon whistling down the glacier. No time was lost in landing the cargo, and, with a rising blizzard at our backs, we drove out to meet the *Aurora*. On reaching the ship a small gale was blowing and our boats were taken in tow.

The first thing to be considered was the mooring of the *Aurora* under the lee of the ice-wall, so as to give us an opportunity of getting the boats aboard. In the meantime they were passed astern, each manned by several hands to keep them bailed out; the rest of us having scrambled up the side. Bringing the ship to anchor in such a wind in uncharted, shoal water was difficult to do in a cool and methodical manner. The sounding machine was kept running with rather dramatic results; depths jumping from five to thirty fathoms in the ship's length, and back again to the original figure in the same distance. A feeling of relief passed round when, after much manœuvring, the anchor was successfully bedded five hundred yards from the face of the cliff.

THE HOME OF THE BLIZZARD

Just at this time the motor-launch broke adrift. Away it swept before a wind of forty-five miles per hour. On account of the cold, and because the engine was drenched with sea-water, some difficulty was found in starting the motor. From the ship's deck we could see Bickerton busily engaged with it. The rudder had been unshipped, and there was no chance of replacing it, for the boat was bobbing about on the waves in a most extraordinary manner. However, Whetter managed to make a jury-rudder which served the purpose, while Hunter, the other occupant, was kept laboriously active with the pump.

They had drifted half a mile, and were approaching the rocks of an islet on which the sea was breaking heavily. Just as every one was becoming very apprehensive, the launch began to forge ahead, and the men had soon escaped from their dangerous predicament. By the united efforts of all hands the boats were hoisted on board and everything was made as "snug" as possible.

The wind steadily increased, and it seemed impossible for the anchor to hold. The strain on the cable straightened out a steel hook two inches in diameter. This caused some embarrassment, as the hook was part of the cable attachment under the fo'e'sle-head. It is remarkable, however, that after this was adjusted the ship did not lose her position up to the time of departure from Adelie Land.

Though we were so close under the shelter of a lofty wall, the waves around us were at least four feet in height and when the wind increased to sixty-five and seventy miles per hour, their crests were cut off and the surface was hidden by a sheet of racing spindrift.

Everything was securely lashed in readiness for going to sea, in case the cable should part. Final arrangements were then made to discharge the cargo quickly as soon as the wind moderated.

Two days had elapsed before the wind showed any signs of abatement. It was 8 P.M. on January 10 when the first boat ventured off with a small cargo, but it was not till the



Hutley

FIRST STEPS IN THE FORMATION OF THE MAIN BASE STATION; LANDING OF STORES AND EQUIPMENT AT THE HEAD OF THE BOAT HARBOUR, CAPE DENISON. IN THE DISTANCE MEN ARE TO BE SEEN SLEDGING THE MATERIALS TO THE SITE SELECTED FOR THE ERECTION OF THE HUT



A VIEW OF A ROCKY STRETCH OF THE ADELE LAND COAST WEST OF COMMONWEALTH BAY

Hurley

FROM MACQUARIE ISLAND TO ADELIE LAND

following morning that a serious start was made. In good weather, every trip between the ship and the boat harbour, a distance of a mile, meant that five or six tons had been landed. It was usual for the loaded launch to tow both whale-boats heavily laden and, in addition, a raft of hut timbers or wireless masts. Some of the sailors, while engaged in building rafts alongside the ship, were capsized into the water and after that the occupation was not a popular one.

Ashore, Wild had rigged a derrick, using for its construction two of the wireless royal masts. It was thus possible to cope with the heavier packages at the landing-place. Of the last-named the air-tractor sledge was by far the most troublesome. With plenty of manual labour, under Wild's skilful direction, this heavy machine was hoisted from the motor-launch, and then carefully swung on to the solid ice-foot.

Captain Davis superintended the discharging operations on the ship, effected by the crew and some of the land party under the direction of the ship's officers. Wild supervised conveyance ashore, and the landing, classification, and safe storage of the various boat-loads. Gillies and Bickerton took alternate shifts in driving the motor-launch. The launch proved invaluable, and we were very glad that it had been included in the equipment, for it did a remarkable amount of work in a minimum of time.

In view of the difficulty of embarking the boats, if another hurricane should arise, tents were erected ashore, so that a party could remain there with the boats moored in a sheltered harbour.

Everything went well until just before midnight on January 12, when the wind again swept down. Wild, four of the men and I were forced to remain ashore. We spent the time constructing a temporary hut of benzine cases, roofed with planks; the walls of which were made massive to resist the winds. This structure was thenceforth known as the "Benzine Hut."

The barometer dropped to 28.5 inches and the wind

THE HOME OF THE BLIZZARD

remained high. We were struck with the singular fact that, even in the height of some of these hurricanes, the sky remained serene and the sun shone brightly. It had been very different when the ship was amongst the pack a few miles to the north, for, there, cloudy and foggy conditions had been the rule. The wind coming to us from the south was dry; obviously an argument for the continental extension of the land in that direction.

At 2 A.M. on January 15 a pre-arranged whistle was sounded from the *Aurora*, advising those of us ashore that the sea had moderated sufficiently to continue unloading. Wild sped away in the launch, but before he had reached the ship the wind renewed its activity. At last, after 2 P.M. on the same day it ceased, and we were able to carry on work until midnight, when the wind descended on us once more. This time, eighteen men remained ashore. After twelve hours there was another lull, and unloading was then continued with only a few intermissions from 1 P.M. on January 16 until the afternoon of January 19.

Never was landing so hampered by adverse conditions, and yet, thanks to the assiduous application of all, a great assortment of materials was safely embarked. Comprised among them were the following: twenty-three tons of coal briquettes, two complete living-huts, a magnetic observatory, the whole of the wireless equipment, including masts, and more than two thousand packages of general supplies containing sufficient food for two years, utensils, instruments, benzine, kerosene, lubricating oils an air-tractor and other sledges.

Then came the time for parting. There was a great field before Wild's party to the west, and it was important that they should be able to make the most of the remainder of the season. My great regret was that I could not be with them. I knew that I had men of experience and ability in Davis and Wild, and felt that the work entrusted to them was in the best of hands. Through the medium of wireless telegraphy I hoped to keep in touch with the Macquarie





Adelie Land

A PANORAMA LOOKING WEST FROM WINTER QUARTERS. ON THE LEFT AND IN THE DISTANCE ARE THE RISING SLOPES OF THE INLAND ICE. THE MORAINES IS IN THE FOREGROUND

Hutch



Adelie Land

A PANORAMA OF THE SEA-FRONT LOOKING EASTWARD FROM WINTER QUARTERS. THE PLATEAU SLOPES ARE VISIBLE TO A HEIGHT OF 1500 FEET

Hutch

FROM MACQUARIE ISLAND TO ADELIE LAND

Island party, the Western Base,* and the ship itself, when in Australian waters.

It was my idea that Wild's party should proceed west and attempt to effect a landing and establish a western wintering station at some place not less than four hundred miles west of Adelie Land. On the way, whenever opportunity presented itself, they were to cache provisions at intervals along the coast in places liable to be visited by sledging parties.

The location of such caches and of the Western Base, it was hoped, would be communicated to us at the Main Base, through the medium of wireless telegraphy from Hobart.

All members of the land parties and the ship's officers met in the ward-room. There were mutual good wishes expressed all round, and then we celebrated previous Antarctic explorers, more especially D'Urville and Wilkes. The toast was drunk in excellent Madeira presented to us by Mr. J. T. Buchanan, who had carried this sample round the world with him when a member of the celebrated *Challenger* expedition.

The motor-launch was hoisted and the anchor raised. Then at 8.45 p.m. on January 19 we clambered over the side into one of the whale-boats and pushed off for Cape Denison, shouting farewells back to the *Aurora*. Several hours later she had disappeared below the north-western horizon, and we had set to work to carve out a home in Adelie Land.

* They were supplied with masts and a receiving set sufficiently sensitive to pick up messages from a distance of five or six hundred miles.

CHAPTER IV

NEW LANDS

LEAVING the land party under my charge at Commonwealth Bay on the evening of January 19, the *Aurora* set her course to round a headland visible on the north-western horizon. At midnight the ship came abreast of this point and continued steaming west, keeping within a distance of five miles of the coast. A break in the icy monotony came with a short tract of islets fronting a background of dark rocky coastline similar to that at Cape Denison but more extensive.

Some six miles east of D'Urville's Cape Discovery, a dangerous reef was sighted extending at right angles across the course. The ship steamed along it and her soundings demonstrated a submerged ridge continuing some twelve miles out to sea. Captain Davis's narrative proceeds :

“ Having cleared this obstacle we followed the coastline to the west from point to point. Twelve miles away we could see the snow-covered slopes rising from the seaward cliffs to an elevation of one thousand five hundred feet. Several small islands were visible close to a shore fringed by numerous large bergs.

“ At 10 P.M. on January 20, our progress to the west was stopped by a fleet of bergs off the mainland and an extensive field of berg-laden pack-ice, trending to the north and north-east. Adelie Land could be traced continuing to the west. Where it disappeared from view there was the appearance of a barrier-formation, suggestive of shelf-ice, running in a northerly direction. Skirting the pack-ice on a north and north-west course,

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we observed the same appearance from the crow's-nest on January 21 and 22."

The stretch of open, navigable, coastal water to the north of Adelie Land, barred by the Mertz Glacier on the east and delimited on the west by more or less compact ice, has been named the D'Urville Sea. We found subsequently that its freedom from obstruction by ice is due to the persistent gales which set off the land in that locality. To the north, pack-ice in variable amount is encountered before reaching the wide open ocean.

The existence of such a "barrier-formation,"* as indicated above, probably resting on a line of reef similar to the one near Cape Discovery, would account for the presence of this ice-field in practically the same position as it was seen by D'Urville in 1840.

Quoting further: "We were unable to see any trace of the high land reported by the United States Squadron (1840) as lying to the west and south beyond the compact ice.

"At 1.30 A.M. on the 23rd the pack-ice was seen to trend to the south-west. After steaming west for twenty-five miles, we stood south in longitude $132^{\circ} 30' E.$, shortly afterwards passing over the charted position of Côte Clarie. The water here was clear of pack-ice, but studded with bergs of immense size. The great barrier which the French ships followed in 1840 had vanished. A collection of huge bergs was the sole remnant to mark its former position.

"At 10 A.M., having passed to the south of the charted position of D'Urville's Côte Clarie, we altered course to $S. 10^{\circ} E.$ true. Good observations placed us at noon in

* An analysis of the data derived from the later voyages of the *Aurora* makes it practically certain that there is a permanent obstacle to the westerly drift of the pack-ice in longitude $137^{\circ} E.$ There is, however, some uncertainty as to the cause of this blockage. An alternative explanation is advanced, namely, that within the area of comparatively shallow water, large bergs are entrapped, and these entangle the drifting pack-ice.

At a distance, large bergs would be undistinguishable from shelf-ice, appearances of which were reported above.

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latitude $65^{\circ} 2' S.$ and $132^{\circ} 26' E.$ A sounding on sand and small stones was taken in one hundred and sixty fathoms. We sailed over the charted position of land east of Wilkes's Cape Carr in clear weather.

“ At 5.30 P.M. land was sighted to the southward—snowy highlands similar to those of Adelie Land but greater in elevation.

“ After sounding in one hundred and fifty-six fathoms on mud, the ship stood directly towards the land until 9 P.M. The distance to the nearest point was estimated at twenty miles ; heavy floe-ice extending from our position, latitude $65^{\circ} 45' S.$ and longitude $132^{\circ} 40' E.,$ right up to the shore. Another sounding realized two hundred and thirty fathoms, on sand and small stones. Some open water was seen to the south-east, but an attempt to force a passage in that direction was frustrated.

“ At 3 A.M. on the 24th we were about twelve miles from the nearest point of the coast, and further progress became impossible. The southern slopes were seamed with numerous crevasses, but at a distance the precise nature of the shores could not be accurately determined.”

To this country, which had never before been seen, was given the name of Wilkes's Land ; as it is only just to commemorate the American Exploring Expedition on the Continent which its leader believed he had discovered in these seas and which he would have found had Fortune favoured him with a fair return for his heroic endeavours.

“ We steered round on a north-westerly course, and at noon on January 24 were slightly to the north of our position at 5.30 A.M. on the 23rd. A sounding reached one hundred and seventy fathoms and a muddy bottom. Environing us were enormous bergs of every kind, one hundred and eighty to two hundred feet in height. During the afternoon a westerly course was maintained in clear water until 4 P.M., when the course was altered to $S. 30^{\circ} W.,$ in the hope of winning through to the land visible on the southern horizon.”



IN OPEN PACK-ICE

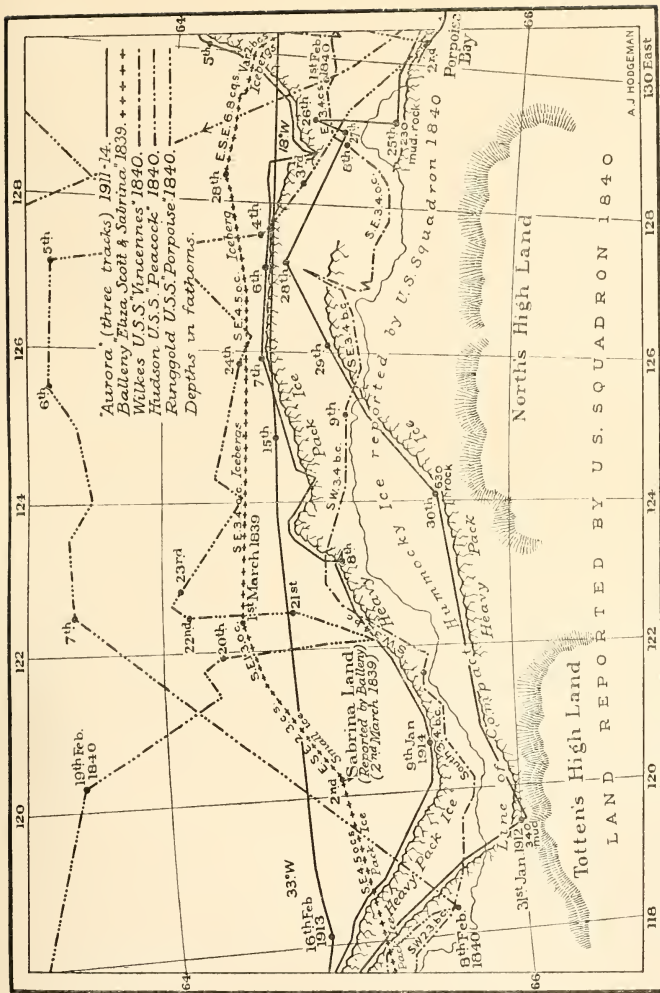
Huber



Queen Mary Land

Huley

THE FACE OF THE SHACKLETON ICE-SHELF 100 MILES NORTH OF THE MAINLAND. EACH STRONGLY-MARKED HORIZONTAL BAND ON THE SHEER WALL REPRESENTS A YEAR'S SNOWFALL.



SHIPS' TRACKS IN THE VICINITY OF TOTTEN'S LAND AND NORTH'S LAND

THE HOME OF THE BLIZZARD

At 8 P.M. the sky was very clear to the southward, and the land could be traced to a great distance until it faded in the south-west. But the ship had come up with the solid floe-ice once more, and had to give way and steam along its edge. This floating breakwater held us off and frustrated all attempts to reach the goal which we sought.

“The next four days was a period of violent gales and heavy seas which drove the ship some distance to the north. Nothing was visible through swirling clouds of snow. The *Aurora* behaved admirably, as she invariably does in heavy weather. The main pack was encountered on January 29, but foggy weather prevailed. It was not until noon on January 31 that the atmosphere was sufficiently clear to obtain good observations. The ship was by this time in the midst of heavy floe in the vicinity of longitude 119° E., and again the course had swung round to south. We had soon passed to the south of Balleny's Sabrina Land without any indication of its existence. Considering the doubtful character of the statements justifying its appearance on the chart, it is not surprising that we did not verify them.

“At 11 A.M. the floes were found too heavy for further advance. The ship was made fast to a big one and a large quantity of ice was taken on board to replenish the fresh-water supply. A tank of two hundred gallons' capacity, heated within by a steam coil from the engine-room, stood on the poop deck. Into this ice was continuously fed, flowing away as it melted into the main tanks in the bottom of the ship.

“At noon the weather was clear, but nothing could be discerned in the south except a faint blue line on the horizon. It may have been a 'lead' of water, an effect of mirage, or even land-ice—in any case we could not approach it.”

The position as indicated by the noon observations placed the ship within seven miles of a portion of Totten's High Land in Wilkes's charts. As high land would have been visible at a great distance, it is clear that Totten's

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High Land either does not exist or is situated a considerable distance from its charted location. A sounding was made in three hundred and forty fathoms.

Towards evening the *Aurora* turned back to open water and cruised along the pack-ice. A sounding next day showed nine hundred and twenty-seven fathoms.

It was about this time that a marked improvement was noted in the compass. Ever since the first approach to Adelie Land it had been found unreliable, for, on account of the proximity to the magnetic pole, the directive force of the needle was so slight that very large local variations were experienced.

The longitude of Wilkes's Knox Land was now approaching. With the exception of Adelie Land, the account by Wilkes concerning Knox Land is more convincing than any other of his statements relating to new Antarctic land. If they had not already disembarked, we had hoped to land the western party in that neighbourhood. It was, therefore, most disappointing when impenetrable ice blocked the way, before Wilkes's "farthest south" in that locality had been reached. Three determined efforts were made to find a weak spot, but each time the *Aurora* was forced to retreat, and the third time was extricated only with great difficulty. In latitude $65^{\circ} 5' S.$ longitude $107^{\circ} 20' E.$, a sounding of three hundred fathoms was made on a rocky bottom. This sounding pointed to the probability of land within sixty miles.

Repulsed from his attack on the pack, Captain Davis set out westward towards the charted position of Termination Land, and in following the trend of the ice was forced a long way to the north.

At 7.40 A.M., February 8, in foggy weather, the ice-cliff of floating shelf-ice was met. This was disposed so as to point in a north-westerly direction and it was late in the day before the ship doubled its northern end. Here the sounding wire ran out for eight hundred and

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fifty fathoms without reaching bottom. Following the wall towards the south-south-east, it was interesting at 5.30 P.M. to find a sounding of one hundred and ten fathoms in latitude $64^{\circ} 45'$. A line of large grounded bergs and massive floe-ice was observed ahead trailing away from the ice-wall towards the north-west.

On plotting the observations, it became apparent that the shelf-ice was in the form of a prolonged tongue some seven miles in breadth. As it occupied the position of the "Termination Land" which has appeared on some charts, (after Wilkes) it was named Termination Ice-Tongue.

A blizzard sprang up, and, after it had been safely weathered in the lee of some grounded bergs, the *Aurora* moved off on the afternoon of February 11. The horizon was obscured by mist, as she pursued a tortuous track amongst bergs and scattered lumps of heavy floe. Gradually the sea became more open, and by noon on February 12 the water had deepened to two hundred and thirty-five fathoms. Good progress was made to the south; the vessel dodging icebergs and detached floes.

The discovery of a comparatively open sea southward of the main pack was a matter of some moment. As later voyages and the observations of the Western Party showed, this tract of sea is a permanent feature of the neighbourhood. I have called it the Davis Sea, after the captain of the *Aurora*, in appreciation of the fact that he placed it on the chart.

At noon, on February 13, in latitude $65^{\circ} 54\frac{1}{2}'$ S. longitude $94^{\circ} 25'$ E., the western face of a long, floating ice-tongue loomed into view. There were five hundred fathoms of water off its extremity, and the cliffs rose vertically to one hundred feet. Soon afterwards land was clearly defined low in the south extending to east and west. This was thenceforth known as Queen Mary Land.

The sphere of operations of the German expedition of 1902 was near at hand, for its vessel, the *Gauss*,

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had wintered, frozen in the pack, one hundred and twenty-five miles to the west. It appeared probable that Queen Mary Land would be found to be continuous * with Kaiser Wilhelm II Land, which the Germans had reached by a sledging journey from their ship across the intervening sea-ice.

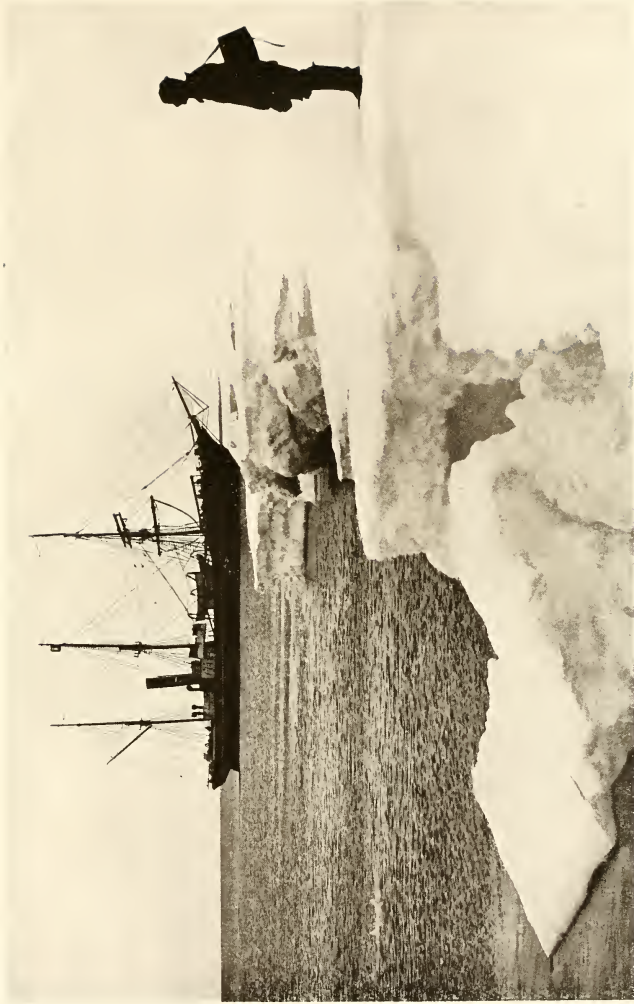
The *Aurora* followed the western side of the ice-tongue for about twenty miles in a southerly direction, at which point there was a white expanse of floe extending right up to the land. Wild and Kennedy, walking several miles towards the land, estimated that it was about twenty-five miles distant. As the surface over which they travelled was traversed by cracks and liable to drift away to sea, all projects of landing there had to be abandoned; furthermore, it was discovered that the ice-tongue, alongside of which the ship lay, was a huge iceberg. A landing on it had been contemplated, but was now out of question.

The main difficulty which arose at this juncture was the failing coal-supply. It was high time to return to Hobart, and, if a western base was to be formed at all, Wild's party would have to be landed without further delay. After a consultation, Davis and Wild decided that under the circumstances an attempt should be made to gain a footing on the adjacent shelf-ice, if nothing better presented itself.

The night was passed anchored to the floe, on the edge of which were numerous Emperor penguins and Weddell seals. A fresh south-easterly wind blew on February 14, and the ship was kept in the shelter of the iceberg. During the day enormous pieces were observed to be continually breaking away from the berg and drifting to leeward.

Captain Davis continues: "At midnight there was a strong swell from the north-east and the temperature went down to 13° F. At 4 A.M., February 15, we reached the northern end of the berg and stood first of all to the east, and then later to the south-east.

* Such was eventually proved to be the case.



Harley

THE *AURORA* ANCHORED TO THICK FLOE-ICE 100 MILES NORTH OF THE WESTERN BASE, QUEEN MARY LAND. IN THIS REGION THE ANNUAL SNOWFALL IS VERY HEAVY, SO THAT IT IS POSSIBLE THAT THE GREAT THICKNESS OF FLOE IS DUE TO THE ACCUMULATION OF ONE YEAR



A BERG WITH INCLUSIONS OF MUD AND ROCK. LONG. 110° E. *Harley*



THE "FLYING FOX" VIEWED FROM THE FLOE-ICE BELOW THE BRINK *Gray*
OF THE SHELF-ICE ON WHICH THE WESTERN PARTY WINTERED

NEW LANDS

“At 8.45 A.M., shelf-ice was observed from aloft, trending approximately north and south in a long wall. At noon we came up with the floe-ice again, in about the same latitude as on the western side of the long iceberg. Land could be seen to the southward. At 1 P.M. the ship stopped at the junction of the floe and the shelf-ice.”

Wild, Harrison and Hoadley went to examine the shelf-ice with a view to its suitability for a wintering station. The cliff was eighty to one hundred feet in height, so that the ice in total thickness must have attained at least as much as six hundred feet. Assisted by snow-ramps slanting down on to the floe, the ascent with ice-axes and alpine rope was fairly easy.

Two hundred yards from the brink, the shelf-ice was thrown into pressure-undulations and fissured by crevasses, but beyond that was apparently sound and unbroken. About seventeen miles to the south the rising slopes of ice-mantled land were visible, fading away to the far east and west.

The ice-shelf was proved later on to extend for two hundred miles from east to west, ostensibly fusing with the Termination Ice-Tongue, whose extremity is one hundred and eighty miles to the north. The whole has been called the Shackleton Ice-Shelf.

Wild and his party unanimously agreed to seize upon this last opportunity, and to winter on the floating ice.

The work of discharging stores was at once commenced. To raise the packages from the floe to the top of the ice-shelf, a “flying-fox” was rigged.

“A kedge-anchor was buried in the sea-ice, and from this a two-and-a-half-inch wire-hawser was led upwards over a pair of sheer-legs on top of the cliff to another anchor buried some distance back. The whole was set taut by a tackle. The stores were then slung to a travelling pulley on the wire, and hauled on to the glacier by means of a rope led through a second pulley on the sheer-legs. The

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ship's company broke stores out of the hold and sledged them three hundred yards to the foot of an aerial, where they were hooked on to the travelling-block by which the shore party, under Wild, raised them to their destination."

"It was most important to accelerate the landing as much as possible, not only on account of the lateness of the season—the *Gauss* had been frozen in on February 22 at a spot only one hundred and seventy miles away—but because the floe was gradually breaking up and floating away. When the last load was hoisted, the water was lapping within ten yards of the 'flying-fox'."

A fresh west-north-west wind on February 17 caused some trouble. Captain Davis writes :

"February 19. The floe to which we have been attached is covered by a foot of water. The ship has been bumping a good deal to-day. Notwithstanding the keen wind and driving snow, every one has worked well. Twelve tons of coal were the last item to go up the cliff."

In all, thirty-six tons of stores were raised on to the shelf-ice, one hundred feet above sea-level, in four days.

"February 20. The weather is very fine and quite a contrast to yesterday. We did not get the coal ashore a moment too soon, as this morning the ice marked by our sledge tracks went to sea in a north-westerly direction, and this afternoon it is drifting back as if under the influence of a tide or current. We sail at 7 A.M. to-morrow.

"I went on to the glacier with Wild during the afternoon. It is somewhat crevassed for about two hundred yards inland, and then a flat surface stretches away as far as the eye can see. I wished the party 'God-speed' this evening, as we sail early to-morrow."

Early on February 21, the ship's company gave their hearty farewell cheers, and the *Aurora* sailed north, leaving Wild and his seven companions on the floating ice.

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The bright weather of the immediate coastal region was soon exchanged for the foggy gloom of the pack.

“February 21, 11 P.M. We are now passing a line of grounded bergs and some heavy floe-ice. Fortunately it is calm, but in the darkness it is difficult to see an opening. The weather is getting thick, and I expect we shall have trouble in working through this line of bergs.

“February 22. I cannot explain how we managed to clear some of the bergs between 11 P.M. last night and 3 A.M. this morning. At first stopping and lying-to was tried, but it was soon evident that the big bergs were moving and would soon hem us in : probably in a position from which we should be unable to extricate ourselves this season.

“So we pushed this way and that, endeavouring to retain freedom at any cost. For instance, about midnight I was ‘starboarding’ to clear what appeared to be the loom of a berg on the starboard bow, when, suddenly, out of the haze a wall seemed to stretch across our course. There was no room to turn, so ‘full speed astern’ was the only alternative. The engines responded immediately, or we must have crashed right into a huge berg. Until daylight it was ice ahead, to port and to starboard—ice everywhere all the time. The absence of wind saved us from disaster. It was a great relief when day broke, showing clearer water to the northward.”

On February 23, the *Aurora* left the shelter of Termination Ice-Tongue, and a course was set nearly true north. There was a fresh breeze from the north-east and a high sea. The ship was desperately short of ballast and the coal had to be carefully husbanded. All movable gear was placed in the bottom of the ship, while the ashes were saved, wetted and put below. The ballast-tanks were found to be leaking and Gillies had considerable trouble in making them watertight.

The distance from the Western Base in Queen Mary Land to Hobart was two thousand three hundred miles,

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through the turbulent seas of the fifties and forties. It was the end of a perilous voyage when the *Aurora* arrived in Hobart with nine tons of coal.

On March 12, the captain's log records :

“ The *Aurora* has done splendidly, beating all attempts of the weather to turn her over. We had two heavy gales during the first week of March, but reached Hobart safely to-day, passing on our way up the Derwent the famous Polar ship, *Fram*, at anchor in Sandy Bay. Flags were dipped and a hearty cheer given for Captain Amundsen and his gallant comrades who had raised the siege of the South Pole.”



SUMMER AT THE BOAT HARBOUR, CAPE DENISON



AN ADELIE PENGUIN ON THE NEST DEFENDING HER EGGS

CHAPTER V

FIRST DAYS IN ADELIE LAND

THE overcrowded whale-boat disgorged its cargo at 10 P.M. on the ice-quay at Cape Denison. The only shelter was a cluster of four tents and the Benzine Hut, so the first consideration was the erection of a commodious living-hut.

While the majority retired to rest to be ready for a fresh burst of work on the morrow, a few of us discussed the preliminary details, and struck the first blows in the laying of the foundations.

A site for the living-hut was finally approved. This was a nearly flat piece of rocky ground of just sufficient size, partially sheltered on the southern side by a large up-standing rock. Other points to recommend it were, proximity to the boat harbour and to a good sledging surface; the ice of the glacier extending to the "front door" on the western side. Several large rocks had to be shifted, and difficulty was anticipated in the firm setting of the stumps. The latter were blocks of wood, three feet in length, embedded in the ground, forming the foundation of the structure. Unfortunately, no such thing as earth or gravel existed in which to sink these posts, and the rock being of the variety known as gneiss, was more than ordinarily tough.

Since two parties had combined, there were two huts available, and these were to be erected so that the smaller adjoined and was in the lee of the larger. The latter was to be the living-room; the former serving as a vestibule, a workshop and an engine-room for the wireless plant. Slight modifications were made in the construction of both huts, but these

THE HOME OF THE BLIZZARD

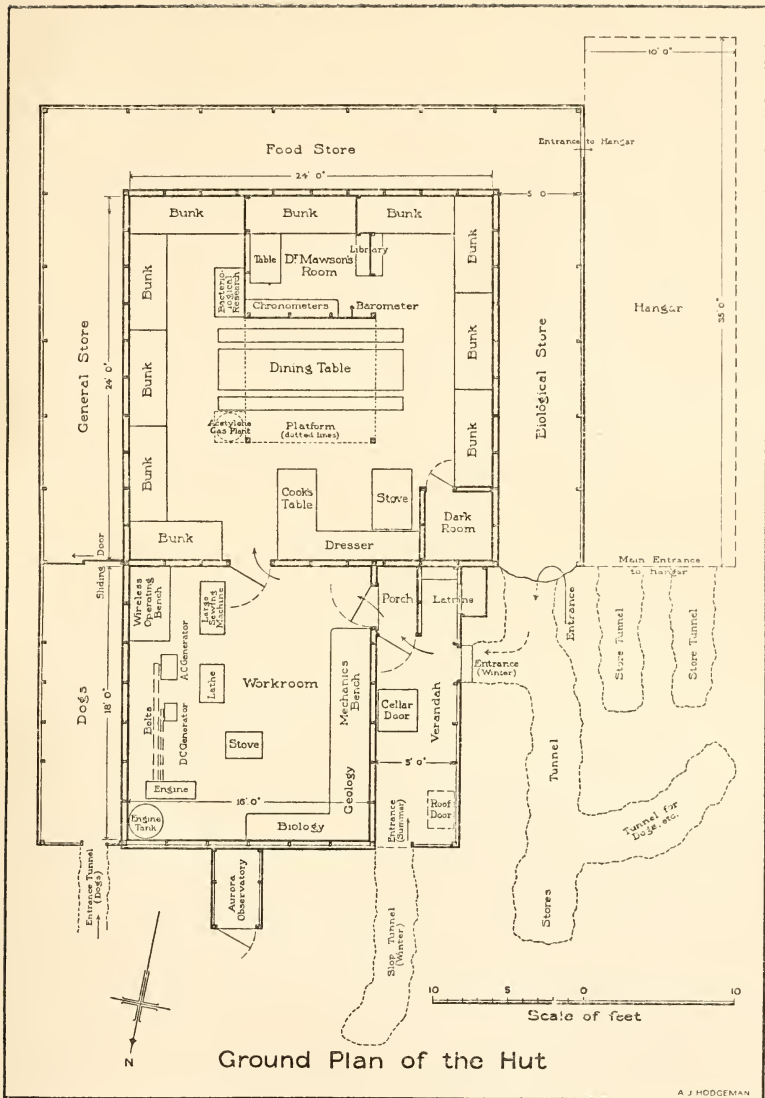
did not affect the framework. After the completion of the living-hut, regular scientific observations were to commence, and the smaller hut was then to be built as opportunity offered.

Nothing has so far been said about the type of hut adopted by our Antarctic stations. As the subject is important, and we had expended much thought thereon before coming to a final decision, a few remarks will not be out of place.

Strength to resist hurricanes, simplicity of construction, portability and resistance to external cold were fundamental. My first idea was to have the huts in the form of pyramids on a square base, to ensure stability in heavy winds and with a large floor-area to reduce the amount of timber used. The final type was designed at the expense of floor-space, which would have been of little use because of the low roof in the parts thus eliminated. In this form, the pyramid extended to within five feet of the ground on the three windward sides so as to include an outside veranda. That veranda, like the motor-launch, was a wonderful convenience, and another of the many things of which we made full use. It lent stability to the structure, assisted to keep the hut warm, served as a store-house, physical laboratory and a dog-shelter.

Round the outside of the three veranda walls boxes of stores were stacked, so as to continue the roof-slope to the ground. Thus, the wind striking the hut met no vertical face, but was partly deflected; the other force-component tending to pin the building to the ground.

All three huts were essentially of the same construction. The largest, on account of its breadth, had four special supporting posts, symmetrically placed near the centre, stretching from the ground to the roof framework. The only subdivisions inside were a small vestibule, a photographic dark-room and my own room. This rough idea I had handed over to Hodgeman, leaving him to complete the details and to draw up the plans. The frame timbers he employed



PLAN OF THE HUT, ADELIE LAND

A. J. HODGEMAN

THE HOME OF THE BLIZZARD

were stronger than usual in a building of the size, and were all securely bolted together. The walls and roof, both inside and outside, were of tongued and grooved pine-boards, made extra wind-proof by two courses of tarred paper. As rain was not expected, this roofing was sufficient. There were four windows in the roof, one on each side of the pyramid. We should thereby get light even though almost buried in snow.

The largest hut was presented by the timber merchants of Sydney, and proved its astonishing strength during the winter hurricanes. The smallest was purchased in Adelaide; the third was built and presented by Messrs. Anthony of Melbourne.

On the morning of January 20 all were at work betimes. As we were securely isolated from a trades hall, our hours of labour ranged from 7 A.M. till 11 P.M.

Dynamite was to be used for blasting out the holes for the reception of the stumps, and so the steel rock-drills were unpacked and boring commenced. This was easier than it appeared, because the rock was much traversed by cracks. By the end of the day a good deal of damage had been done to the rock, at the expense of a few sore fingers and wrists caused by the sledge-hammers missing the drills. The work was tedious, for water introduced into the holes had a habit of freezing. The metal drills, too, tended to be brittle in the cold and required to be tempered softer than usual. Hannam operated the forge, and picks and drills were sent along for pointing; an outcrop of gneiss serving as an anvil.

Among other things it was found difficult to fire the charges, for, when frozen, dynamite is not readily exploded. This was overcome by carrying the sticks inside one's pocket until the last moment. In the absence of earth or clay, we had no tamping material until some one suggested guano from the penguin rookeries, which proved a great success.

Next day the stumps were in place; most of them being fixed by wedges and other devices. Cement was tried, but



Adelie Land

Mertz

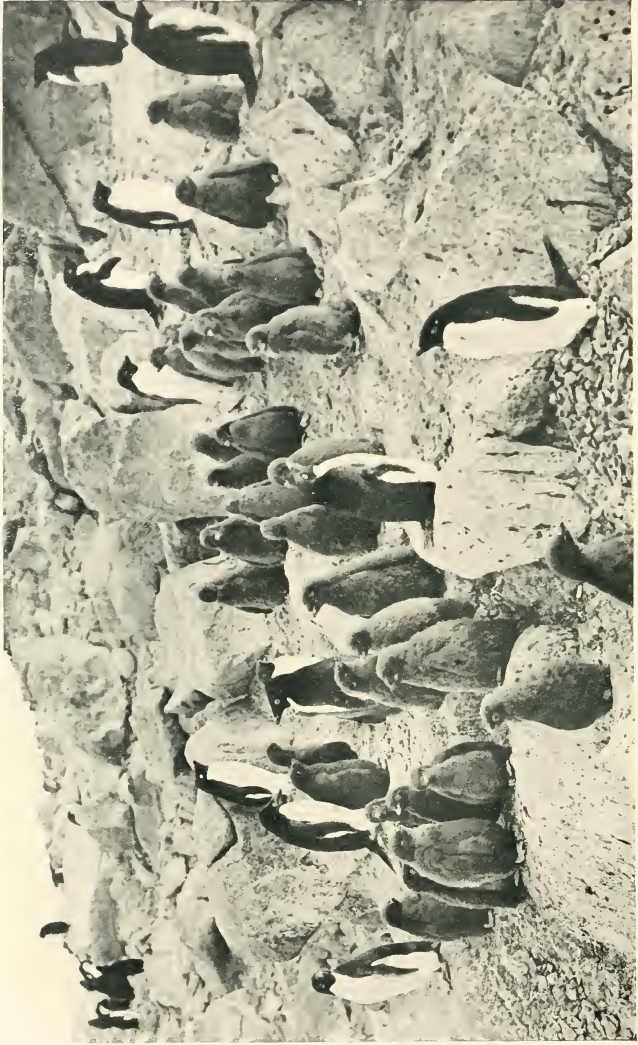
THE LIVING-HUT, NEARING COMPLETION. THE TENTS AND SHELTER BUILT OF BENZINE CASES USED AS TEMPORARY QUARTERS ARE SHOWN



Adelie Land

Hurley

THE COMPLETION OF THE HUT—CHEERING THE UNION JACK AS IT WAS
HOISTED ON THE FLAG POLE



Adelle Land

ABELLE PENGUINS "AT HOME," CAPE DENISON

FIRST DAYS IN ADELIE LAND

it is doubtful if any good came of it, for the low temperature did not encourage it to set well. By the evening, the bottom plates were laid on and bolted to the tops of the stumps, and everything was ready for the superstructure.

On January 22, while some were busy with the floor-joists and wall-frames, others carried boulders from the neighbouring moraine, filling in the whole space between the stumps. These were eventually embedded in a mass of boulders, as much as three feet deep in places. By the time both huts were erected, nearly fifty tons of stones had been used in the foundations—a circumstance we did not regret at a later date.

Hodgeman was appointed clerk of works on the construction, and was kept unusually busy selecting timber, patrolling among the workmen, and searching for his foot-rule which had an unaccountable trick of vanishing in thin air.

Hannam had various occupations, but one was to attend to the needs of the inner man, until the completion of the hut. There is no doubt that he was regarded at this time as the most important and popular member of the party, for our appetites were abnormally good. About an hour before meals he was to be seen rummaging amongst the cases of provisions, selecting tins of various brands and hues from the great confusion. However remote their source or diverse their colour, experience taught us that only one preparation would emerge from the tent-kitchen. It was a multifarious stew. Its good quality was undoubted, for a few minutes after the "dinner-bell rang" there was not a particle left. The "dinner-bell" was a lusty shout from the master cook, which was re-echoed by the brawny mob who rushed madly to the Benzine Hut. Plates and mugs were seized and portions measured out, while the diners distributed themselves on odd boxes lying about on the ice. Many who were accustomed to restaurants built tables of kerosene cases and dined *al fresco*. After the limited stew, the company fared on cocoa, biscuits—"hard tack"—and jam, all *ad libitum*.

THE HOME OF THE BLIZZARD

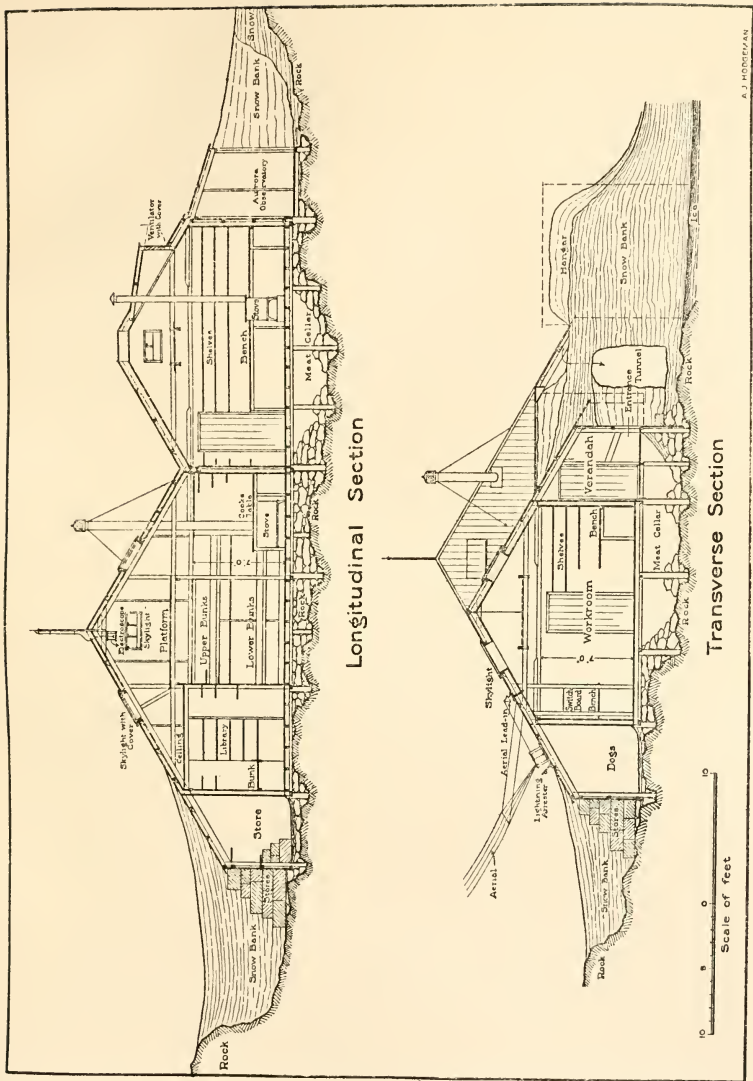
On those rare summer days, the sun blazed down on the blue ice; skua gulls nestled in groups on the snow; sly penguins waddled along to inspect the building operations; seals basked in torpid slumber on the shore; out on the sapphire bay the milk-white bergs floated in the swell. We can all paint our own picture of the good times round the Benzine Hut. We worked hard, ate heartily and enjoyed life.

By the evening of January 24 the floor and outside walls were finished, and the roof-frame was in position. Work on the roof was the coldest job of all, for now there was rarely an hour free from a cold breeze, at times reaching the velocity of a gale. This came directly down from the plateau, and to sit with exposed fingers handling hammer and nails was not an enviable job. To add to our troubles, the boards were all badly warped from being continually wet with seawater on the voyage. However, by judicious "gadgetting," as the phrase went, they were got into place.

The windward roof was up on January 25, and several of us camped in sleeping-bags under its shelter. Already Hannam had unpacked the large range and put the parts together in the kitchen. Henceforth the cooking operations were simplified, for previously a sledging-cooker had been used.

Mention of the stove recalls a very cold episode. It happened that while our goods were being lifted from the boats to the landing-stage, a case had fallen into the harbour. When the parts of the stove were being assembled, several important items were found to be missing, and it was thought that they might compose the contents of the unknown case lying in the kelp at the bottom of the bay.

Laseron and I went on board the whale-boat one day at low water, and located the box with a pole, but though we used several devices with hooks, we were unable to get hold of it. At last I went in, and, standing on tip-toe, could just reach it and keep my head above water. It took some time to extricate from the kelp, following which I established a



A. J. HODGKIN

Longitudinal Section

Transverse Section

SECTIONS ACROSS THE HUT, ADELIE LAND

THE HOME OF THE BLIZZARD

new record for myself in dressing. The case turned out to be full of jam, and we had to make a new search for the missing parts. I do not think I looked very exhilarated after that bath, but strange to say, a few days later Correll tried an early morning swim which was the last voluntary dip attempted by any one.

The enthusiasm of the builders rose to its highest pitch as the roof neared completion, and we came in sight of a firm and solid habitation, secure from the winds which harassed us daily. A dozen hammers worked at once, each concentrated upon a specific job. The ardour with which those engaged upon the ceiling inside the hut plied their nails resulted in several minor casualties to those sitting on the roof, deeply intent on the outer lining. A climax was reached when McLean, working on the steeply inclined roof, lost his footing and, in passing, seized hold of the wire-stay of the chimney as a last hope. Alas, that was the only stay, and as he proceeded over the end of the roof into a bank of snow, Ninnis, within the hut, convinced that nothing less than a cyclone had struck the building, gallantly held on to the lower hot section amidst a shower of soot.

Everybody was in the best of spirits, and things went ahead merrily. On January 30 the main building was almost completed, and all slept under its roof. Bunks had been constructed, forming a double tier around three sides of the room. For the first time since coming ashore we retired to sleep in blankets; fur sleeping-bags had been previously used. That night the sky which had been clear for a fortnight banked up with nimbus cloud, and Murphy, who was sleeping under a gap in the roof, woke up next morning to find over him a fine counterpane of snow. He received hearty congratulations all round.

Regular meteorological observations began on February 1. The various instruments had been unpacked as soon as the outer shell of the Hut was completed. The barometer and barograph were kept running inside. Outside there were two large screens for the reception of a number of the

FIRST DAYS IN ADELIE LAND

instruments. It was important to erect these as near the Hut as possible. The standard thermometer, thermograph and hygrograph were to occupy one of the screens, a convenient site for which was chosen about twenty yards to the east. Close by there was also a nephoscope for determining the motion of clouds. The immediate vicinity of the Hut, being a gully-like depression, was unsuitable for the wind and sunshine recorders. A more distant site, on a rocky ridge to the east, was chosen for these. There were set up a recording anemometer (wind-velocity meter), a sunshine-meter and the second screen containing the anemograph (wind-direction recorder).

Madigan was to take charge of the meteorological observations and he, assisted by Ninnis and Mertz, erected the two screens and mounted the instruments. Special care was taken to secure the screens against violent winds. Phosphor-bronze wire-stays, with a breaking strength of one ton, were used, attached to billets of wood driven into fissures in the rock. Strong as these wires were, several breakages had to be replaced during the year.

Webb was busy with the magnetic work. For this two huts were to be erected; the first for "absolute" determinations, the second for housing the recording instruments—the magnetographs. Distant sites, away from the magnetic disturbances of the Hut, were chosen. Webb and Stillwell immediately set to work as soon as they could be spared from the main building. For the "absolute hut" there were only scrap materials available; the "magnetograph house," alone, had been brought complete. They had a chilly job, for as the days went by the weather steadily became worse. Yet in a little over a week there were only the finishing touches to make, and the first observations were started.

It was now necessary to institute a routine of night-watchmen, cooks and messmen. The night-watchman's duties included periodic meteorological observations, attention to the fire in the range, and other miscellaneous duties arising between the hours of 8 P.M. and 8 A.M. The cook pre-

THE HOME OF THE BLIZZARD

pared the meals, and the messman of the day rendered any assistance necessary. A rotation was adopted, so arranged that those most actively engaged in scientific observations were least saddled with domestic duties. Thus each contributed his equivalent share of work.

Whilst others were occupied finishing off the interior of the hut, Whetter and Close sledged the cases of stores across from the landing-stage, classified them and stacked them against the veranda walls. An additional barricade was constructed of flour cases, in the form of a wall, which increased the breadth of the rocky break-wind on the southern side.

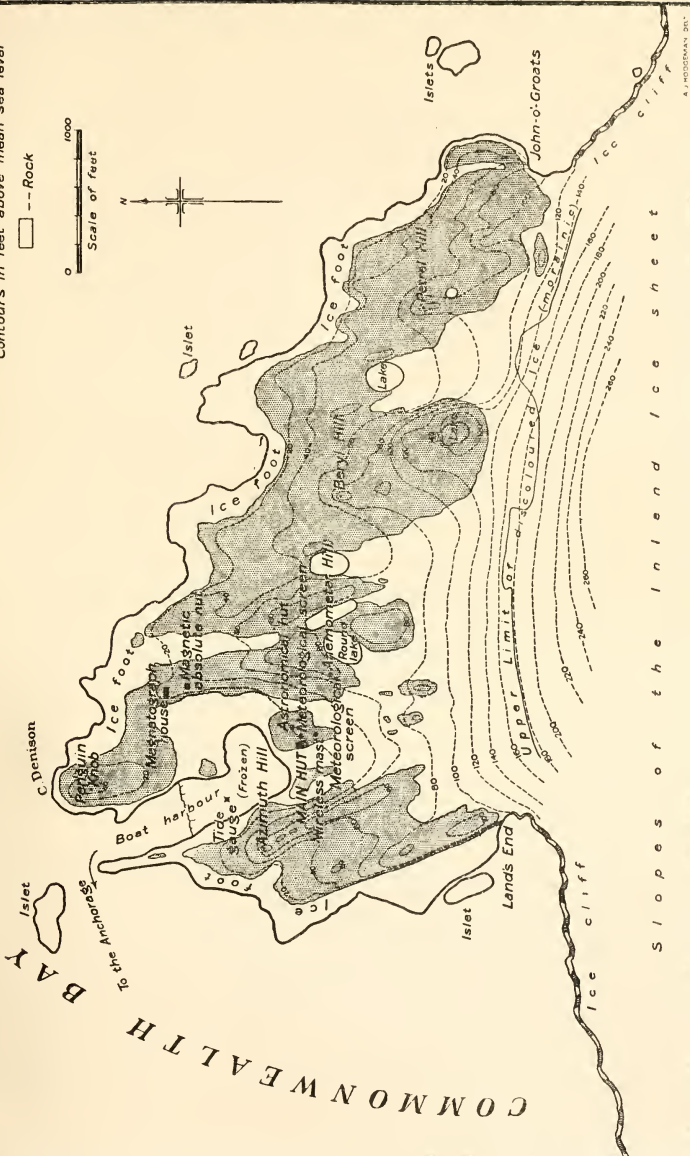
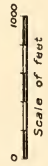
Murphy, who was in charge of all the stores, saw that a good stock of food was accessible in the veranda. Here he put up shelves and unpacked cases, so that samples of everything were at hand on the shortest notice. Liquids liable to freeze and burst their bottles were taken into the Hut.

Already we had several times seized the opportunity of a calm hour to take out the whale-boat and assist Hunter to set traps and make a few hauls with the hand-dredge. Even in five fathoms, bright red and brown star-fish had been caught in the trap, as well as numerous specimens of a common Antarctic fish known as *Notothenia*. In ten fathoms and over the results were better, though in no case was the catch so abundant as one would expect from the amount of life in the water. The luxuriant kelp probably interfered with the proper working of the traps. Fish of the same species as the above were caught on a hand-line.

Hunter, our biologist, was very unfortunate in crushing some of his fingers while carrying a heavy case. This accident came at a time when he had just recovered from a severe strain of the knee-joint which he suffered during our activities in the Queen's Wharf shed at Hobart. Several of us were just going out to the traps one afternoon when the casualty occurred. Hunter was very anxious to go, so we

Contours in feet above mean sea level

--- Rock



COMMONWEALTH BAY

Slopes of the inland ice sheet

THE VICINITY OF THE MAIN BASE, ADELIE LAND

A. J. HODGKINSON, 2011

THE HOME OF THE BLIZZARD

waited until McLean had sewn up a couple of his fingertips.

Weddell, and with them occasional crab-eater seals, were at this time always to be found in numbers sleeping on the ice-foot around the boat harbour. It appeared as if we would have plenty of meat throughout the year, so I waited until the building was completed before laying in a stock. The penguins, however, were diminishing in numbers fast and the young birds in the rookeries had grown very large and were beginning to migrate to warmer regions. Several parties, therefore, raided them and secured some hundreds for the winter.

Giant petrels and skua gulls swarmed in flocks round the seals' and penguins' carcasses. These scavengers demolish an incredible amount of meat and blubber in a short time. It is a diabolical sight to witness a group of birds tearing out the viscera of a seal, dancing the while with wings outspread.

During the afternoon of February 11 Webb came in with the news that a sea elephant was making its way over the rocks near the shore. We rushed out in time to see it standing over Johnson, one of the dogs, who, true to his name, did not look abashed. Attracted by more formidable antagonists, the monster left Johnson and came towards us. He was a fair-sized male with a good skin, so we shot him before he had time to get back into the sea. His measurements were seventeen feet six inches in length and twelve feet in maximum circumference.

With the temperature well below freezing-point, skinning is cold work in the wind, and must be done before the animal has time to freeze stiff. A number of us set to work flaying. In order to move the mountain of flesh a Westing purchase and a "handy-billy" (rope and block purchase) had to be rigged. It was several hours before everything was disposed of; the skin and skull for the biological collection and the meat and blubber for the dogs. Ninnis and Mertz, who were the wardens of the dogs, cut up about one ton of meat



Adelie Land

Hudley

A VIEW OF THE MAIN-BASE HUT IN FEBRUARY, 1912. JUST PRIOR TO ITS COMPLETION. WITHIN A FEW DAYS OF THE TAKING OF THIS PICTURE THE HUT BECAME SO BURIED IN PACKED SNOW THAT EVER AFTERWARDS LITTLE BEYOND THE ROOF WAS TO BE SEEN.

FIRST DAYS IN ADELIE LAND

and blubber, and stored it as a winter reserve for their charges.

It may be mentioned that sea elephants are sub-antarctic in distribution, and only rarely have these animals been observed on the shores of the Antarctic continent. As far as I am aware, the only other occasion of such an occurrence was noted by Captain Scott in MacMurdo Sound. Wilkes reported many of them on the pack-ice to the north of the Balleny Islands, so possibly they have a stronghold in that vicinity.

The dogs, ever since their arrival ashore, had been chained up on the rocks below the Hut. The continuous wind worried them a good deal, but they had a substantial offset to the cold in a plentiful supply of seal-meat. On the whole, they were in a much better condition than when they left the *Aurora*. Nineteen in all, they had an odd assemblage of names, which seemed to grow into them until nothing else was so suitable: Basilisk, Betli, Caruso, Castor, Franklin, Fusilier, Gadget, George, Ginger, Ginger Bitch, Grandmother, Haldane, Jappy, John Bull, Johnson, Mary, Pavlova, Scott and Shackleton. Grandmother would have been better known as Grandfather. He was said to have a grandmotherly appearance; that is why he received the former name. The head dog was Basilisk, and next to him came Shackleton.

Early in February, after having experienced nothing but a succession of gales for nearly a month, I was driven to conclude that the average local weather must be much more windy than in any other part of Antarctica. The conditions were not at all favourable for sledging, which I had hoped to commence as soon as the Hut was completed. Now that the time had arrived and the weather was still adverse, it seemed clear that our first duty was to see everything snug for the winter before making an attempt.

Hannam, assisted by Bickerton, Madigan and others, had laid heavy and firm foundations for the petrol-motor and generator. The floor of the smaller room was then built around these bed-plates, and last of all came the walls and roof. Murphy, Bage and Hodgeman were chiefly responsible for the

THE HOME OF THE BLIZZARD

last-named, which was practically completed by February 10. Minor additions and modifications were added after that date. Meanwhile, Hannam continued to unpack and mount the instruments forming the wireless plants. Along one wall and portion of another, in the outer hut, a bench was built for mechanical work and for scientific purposes. This was in future to be the work-room.

Our home had attained to a stage of complex perfection. To penetrate to the inside hut, the stranger reverently steps through a hole in the snow to the veranda, then by way of a vestibule with an inner and outer door he has invaded the privacy of the work-room, from which with fear and trembling he passes by a third door into the sanctum sanctorum. Later, when the snow-tunnel system came into vogue, the place became another Labyrinth of Minos.

The three doors were fitted with springs to keep them shut unless they were jammed open for ventilation, which was at once obtained by opening an aperture in the cooking-range flue. A current of air would then circulate through the open doors. The roof windows were immovable and sealed on the inside by a thick accumulation of ice. An officer of public health, unacquainted with the climate of Adelie Land, would be inclined to regard the absence of more adequate ventilation as a serious omission. It would enlighten him to know that much of our spare time, for a month after the completion of the building, was spent in plugging off draughts which found their way through most unexpected places, urged by a wind-pressure from without of many pounds to the square foot.

Excepting the small portion used as an entrance-porch, the verandas were left without any better flooring than well-trodden snow. In the boarded floor of the porch was a trap-door which led down into a shallow cellar extending under a portion of the work-room. The cellar was a refrigerating chamber for fresh meat and contained fifteen carcasses of mutton, besides piles of seal-meat and penguins.



Hutchy

WEDDELL SEALS ASLEEP ON PANCAKE ICE

Adelie Land



Harley

ADELIE PENGUIN AFTER WEATHERING A SEVERE BLIZZARD. OBSERVE
THE LUMPS OF ICE ADHERING TO IT

FIRST DAYS IN ADELIE LAND

In preparation for our contemplated sledging, masts, spars and sails were fitted to some of the sledges, rations were prepared and alterations made to harness and clothing. Soon a sledge stood packed, ready to set out on the first fine day.

For several days in succession, about the middle of February, the otherwise continuous wind fell off to a calm for several hours in the evening. On those occasions Mertz gave us some fine exhibitions of skiing, of which art he was a consummate master. Skis had been provided for every one, in case we should have to traverse a country where the snow lay soft and deep. From the outset, there was little chance of that being the case in wind-scoured Adelie Land. Nevertheless, most of the men seized the few opportunities we had to become more practised in their use. My final opinion, however, was that if we had all been experts like Mertz, we could have used them with advantage from time to time.

The end of February approached. We were fully prepared for sledging, and were looking forward to it with great expectation. The wind still continued, often rising to the force of a hurricane, and was mostly accompanied by snow.

One evening, when we were all at dinner, there was a sudden noise which drowned the rush of the blizzard. It was found that several sledges had been blown away from their position to the south of the Hut, striking the building as they passed. They were all rescued except one, which had already reached the sea and was travelling rapidly toward Australia.

Mertz, Bage and I had taken advantage of a lull to ascend the ice-slope to the south, and to erect a flag-pole at a distance of two miles. Besides being a beacon for sledging parties, it was used for ablation measurements. These were determinations of the annual wasting of the ice-surface, whether by evaporation, melting, or wind-abrasion.

Webb and Stillwell, assisted by others, had commenced to build the Magnetograph House. Dr. Chree, of the British

THE HOME OF THE BLIZZARD

National Physical Laboratory, had arranged that the German Antarctic Expedition, several observatories in low latitudes and our own Expedition, should take special "quick runs," synchronously, twice each month. A "quick run" was a continuous, careful observation made over a period of two hours, on a more searching time-scale than usual. Until the Magnetograph House was established this could not be done efficiently, and so the construction of this hut was pushed on as quickly as possible.

Many other schemes required our attention, and there was not a spare moment for any one. Though we chafed at the delay in sledging, there was some consolation in the fact that the scientific programme was daily becoming more and more complete.





John Lind H 963
 A PANORAMIC VIEW LOOKING SOUTH FROM NEAR THE HUT. IN THE DISTANCE ARE THE SLOPES OF THE INLAND ICE-SHEET. IN THE FOREGROUND IS THE TERMINAL MORAINNE. BETWEEN THE ROCKS AND THE FIGURE IS A ZONE WHERE RAPID THAWING TAKES PLACE IN THE SUMMER OWING TO THE AMOUNT OF DIRT CONTAINED IN THE ICE



John Lind H 964
 A PANORAMIC VIEW LOOKING NORTH TOWARDS THE SEA. IN THE MIDDLE OF THE PICTURE IS ROUND LAKE. THE HUT IS TOWARDS THE LEFT-HAND SIDE AND THE ANEMOGRAPH IS ON THE HILL. THE MEN ARE PRACTISING SKI-RUNNING

CHAPTER VI

AUTUMN PROSPECTS

AS far as we could see, the inland ice was an unbroken plateau with no natural landmarks. From the hinterland in a vast solid stream the ice flowed, with heavily crevassed downfalls near the coast. Traversing this from north to south was a narrow belt, reasonably free from pitfalls, running as a spur down to the sea. To reach the Hut in safety it would be necessary for sledging parties returning from the interior to descend by this highway. The problem was to locate the path. Determinations of latitude and longitude would guide them to the neighbourhood of Commonwealth Bay, but the coastline in the vicinity of Winter Quarters, with the rocks and islets, would not come into view until within two miles, as above that point the icy slopes filled the foreground up to the distant berg-studded horizon. Delays in reaching the Hut owing to the difficult descent might have serious consequences, for provisions are usually short near the conclusion of a sledging journey.

The necessity of making artificial landmarks was, therefore, most obvious. Already we had a flagstaff two miles to the south. It was now my intention to run a line of similar marks backwards to the plateau.

Bage, Madigan and I were to form a reconnoitring party to plant these flags, and to make a journey of a few days' duration into the hinterland, to see its possibilities, and with a view to an extended sledging campaign to commence as soon as possible after our return. It was decided not to make use of the dogs until later in the year, when they would be in better form.

THE HOME OF THE BLIZZARD

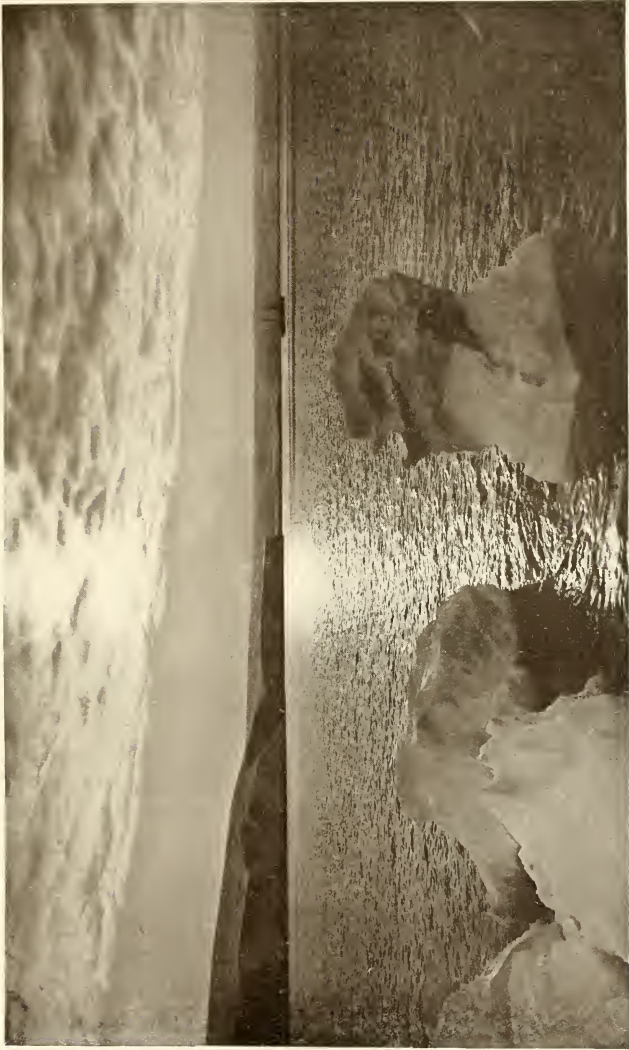
The wind continued, accompanied by more or less drift-snow. This appeared to be the settled state of the weather. We decided to move out as soon as a moderate phase should occur.

On the afternoon of February 28 the weather cleared up for several hours, and we decided to leave on the following day. The wind resumed operations once more, but fell off late on February 29, when we made a start. We intended to get the packed sledge up the first steep slope, there to leave it until the morrow. The drift was slight and low, flowing along like a stream below our knees. Bickerton, Hurley and Mertz assisted us with the hauling. At a distance of a little more than a mile, at an elevation of five hundred feet, the sledge was anchored and we returned to the Hut for the night.

Next morning the weather cleared still more, and we left just before noon. Three miles out, a mast and flag were erected, when our companions of the day before, who had again assisted us, turned back. At five and a half miles the brow of the main rise was reached, and the gradient became much flatter beyond it. The elevation was found to be one thousand five hundred feet.

To the south nothing was visible but a great, wan, icy wilderness. To the north a headland appeared on either hand, each about twenty-five miles away, and between them lay an expanse of sea dotted with many bergs. The nearer portions of the coast, together with the Mackellar Islets, were lost to view on account of the curvature of the foreground.

During most of the day we had travelled over a surface of clear ice, marked by occasional scars where fissuring, now healed, had at some time taken place. Beyond the three-mile flag, however, the ice was gashed at frequent intervals, producing irregular crevasses, usually a few yards in length and, for the most part, choked with snow. At five and a half miles we were on the edge of a strip of snow, half a mile across, whose whiteness was thrown



AN EVENING VIEW FROM CAPE DENISON

Harley



THE HEAD OF A WEDDELL SEAL

Hurley



A WEDDELL SEAL SCRATCHING HIMSELF. "DRAT THOSE FLIES!" *Hurley*

AUTUMN PROSPECTS

in dazzling contrast against the foil of transparent, dark ice.

It was dusk, and light drift commenced to scud by, so, as this was a suitable place to erect a flag, we decided to camp for the night. Some hours later I woke up to hear a blizzard blowing outside, and to find Madigan fumbling amongst some gear at the head-end of the tent. From inside my bag I called out to inquire if there was anything wrong, and received a reply that he was looking for the primus-pricker. Then he slipped back into his sleeping-bag, and all became quiet, except for the snow beating against the tent. So I presumed that he had found it. Revolving the incident in my mind, and dimly wondering what use he could have for a primus-pricker in the middle of the night, I again fell asleep. In the morning the blizzard was still blowing, accompanied by a good deal of drift. On inquiry I found that Madigan knew nothing of his midnight escapade. It was a touch of somnambulism.

It would serve no useful purpose to go on in thick drift, for the main object of our journey was to define the best route through the crevassed zone; and that could only be done on a clear day. I decided, accordingly, that if the weather did not improve by noon to leave the sledge with the gear and walk back to the Hut, intending to make another attempt when conditions became more settled.

Whilst the others erected a flagstaff and froze the legs of a drift-proof box (containing a thermograph) into the ice, I made lunch and prepared for our departure. The tent was taken down and everything lashed securely on the sledge.

It was nearly 3 P.M. when we set out in thick drift, and in two hours we were at the Hut; the weather having steadily improved as we descended. On comparing notes with those at home it appeared that we, at the fifteen hundred feet level, had experienced much more wind and drift than they at sea-level.

Webb and his assistants were beginning to make quite a

THE HOME OF THE BLIZZARD

display at the Magnetograph House. The framework, which had already been erected once, to be demolished by the wind, was now strongly rebuilt and was ready for the outside covering of boards.

From the night of our return to March 8 there was a high wind accompanied by much drift; for some hours it continued at eighty miles per hour, the mean temperature being about 15° F., with a minimum of 5° F.

Up to this date the dogs had been kept on the chain, on account of their depredations amongst the seals and penguins. The severe weather now made it necessary to release them. Thenceforth, their abode for part of the day was inside the veranda, where a section was barricaded-off for their exclusive use. Outside in heavy drift their habit was to take up a position in the lee of some large object, such as the Hut. In such a position they were soon completely buried and oblivious to the outside elements. Thus one would sometimes tread on a dog, hidden beneath the snow; and the dog often showed less surprise than the offending man. What the dogs detested most of all during the blizzard-spells was the drift-snow filling their eyes until they were forced to stop and brush it away frantically with their paws. Other inconveniences were the icy casing which formed from the thawing snow on their thick coats, and the fact that when they lay in one position, especially on ice, for any length of time they become frozen down, and only freed themselves at the expense of tufts of hair. In high winds, accompanied by a low temperature, they were certainly very miserable, unless in some kind of shelter.

Several families were born at this time, but although we did everything possible for them they all perished, except one; the offspring of Gadget. This puppy was called "Blizzard." It was housed for a while in the veranda and, later on, in the Hangar. Needless to say, Blizzard was a great favourite and much in demand as a pet.

On the night of March 7, Caruso, who had been in poor condition for some time, was found to have a gaping wound

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around the neck. It was a clean cut, an inch deep and almost a foot in length. The cause was never satisfactorily explained, though a piece of strong string embedded in the wound evidently made the incision. Caruso was brought inside, and, whilst Whetter administered chloroform, McLean sewed up the wound. After careful attention for some days, it healed fairly well, but as the dog's general health was worse, it was deemed advisable to shoot him.

The outer shell of the Magnetograph House was nearly completed, affording a protection for those who worked on the interior linings. When completed, the walls and roof consisted of two coverings of tongued and grooved pine boards and three layers of thick tarred paper.

While there still remained a breach in the wall, Hurley repaired there with his cinematograph camera and took a film showing the clouds of drift-snow whirling past. In those days we were not educated in methods of progression against heavy winds; so, in order to get Hurley and his bulky camera back to the Hut, we formed a scrum on the windward side and with a strong "forward" rush beat our formidable opponent.

On March 8 the blizzard died away and a good day followed. All hands joined in building a solid stone wall around the outside of the Magnetograph House. This piece of work, in which thirty tons of rock were utilized, was completed on the following day. The wall reached almost to the roof on every side. The unprotected roof was lagged with sacks and sheep-skins and, after this had been effected, the hut became practically windtight. The external covering controlled the influx of cold from the penetrating winds, and, on the other hand, the conduction of the sun's warmth in summer. Thus a steady temperature was maintained; a most desirable feature in a magnetograph house. Webb had the instruments set up in a few days, and they were working before the end of the month.

After the calm of March 8, the wind steadily increased

THE HOME OF THE BLIZZARD

and became worse than ever. Madigan, who was in charge of the whale-boat, kept it moored in the boat-harbour under shelter of the ice-foot. An excursion was made to the fish traps, buoyed half a mile off shore, on February 8, and it was found that one had been carried away in the hurricane. The other was brought in very much battered. That night it was decided at the first opportunity to haul up the boat and house it for the winter. Alas! the wind came down again too quickly, increasing in force, with dense drift. It was still in full career on the 12th, when Madigan came in with the news that the boat had disappeared. It was no fault of the rope-attachments for they were securely made and so we were left to conclude that a great mass of ice had broken away from the overhanging shelf and carried everything before it.

The regularity of the high-velocity winds was already recognized as one of the most remarkable features of Adelie Land. By itself such wind would have been bad enough, but, accompanied by dense volumes of drifting snow, it effectually put a stop to most outdoor occupations.

The roof and walls of the veranda being covered with a single layer of tongued and grooved boards, the snow drove through every chink. The cases outside were a partial protection, but the cracks were innumerable, and in the course of twenty-four hours the snow inside had collected in deep drifts. This required to be shovelled out each day or the veranda would have been entirely blocked.

Much time was spent endeavouring to make it drift-tight; but as the materials at our disposal were very limited, the result was never absolutely satisfactory. The small veranda serving as an entrance-porch was deluged with snow which drove in past the canvas doorway. The only way to get over this trouble was to shovel out the accumulations every morning. On one occasion, when Close was night-watchman, the drift poured through in such volume that each time he wished to go outside it took him half an hour to dig his way out. On account of this periodic influx, the



THE METEOROLOGIST WITH AN ICE-MASK

Harley



Adelie Land

WHERE THE PLATEAU DESCENDS TO COMMONWEALTH BAY

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vestibule doorway to the workroom was moved to the other end of the wall, where the invading snow had farther to travel and was consequently less obstructive.

One advantage of the deposit of snow around the Hut was that all draughts were sealed off. Before this happened it was found very difficult to keep the inside temperature up to 40° F. A temperature taken within the Hut varied according to the specific position in reference to the walls and stove. That shown by the thermometer attached to the standard barometer, which was suspended near the centre of the room, was taken as the "hut temperature." Near the floor and walls it was lower, and higher, of course, near the stove. On one occasion, in the early days, I remember the "hut temperature" being 19° F., notwithstanding the heat from the large range. Under these conditions the writing-ink and various solutions all over the place froze, and, when the night-watchman woke up the shivering community he had many clamorous demands to satisfy. The photographer produced an interesting product from the dark room—a transparent cast of a developing-dish in which a photographic plate left overnight to wash was firmly set.

We arranged to maintain an inside temperature of 40° F.; when it rose to 50° F. means were taken to reduce it. The cooking-range, a large one designed to burn anthracite coal, was the general warming apparatus. To raise the temperature quickly, blocks of seal blubber, of which there was always a supply at hand, were used. The coal consumption averaged one hundred pounds a day, approximately; this being reduced at a later date to seventy-five pounds by employing a special damper for the chimney. The damper designed for ordinary climates allowed too much draught to be sucked through during the high winds which prevailed continually.

The chimney was fitted with a cowl which had to be specially secured to keep it in place. During heavy drifts the cowl became choked with snow and ice, and the Hut

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would rapidly fill with smoke until some one, hurriedly donning burberrys, rushed out with an ice-axe to chip an outlet for the draught. The chimney was very short and securely stayed, projecting through the lee side of the roof, where the pressure of the wind was least felt.

The first good display of aurora polaris was witnessed during the evening of March 12, though no doubt there had been other exhibitions obscured by the drift. As the days went by and the equinox drew near, auroral phenomena were with few exceptions visible on clear evenings. In the majority of cases they showed up low in the northern sky.

In the midst of a torment of wind, March 15 came as a beautiful, sunny, almost calm day. I remarked in my diary that it was "typical Antarctic weather," thinking of those halcyon days which belong to the climate of the southern shores of the Ross Sea. In Adelie Land, we were destined to find, it was hard to number more than a dozen or two in the year.

A fine day! the psychological effect was remarkable; pessimism vanished, and we argued that with the passing of the equinox there would be a marked change for the better. Not a moment was lost: some were employed in making anchorages for the wireless masts; others commenced to construct a Hangar to house the air-tractor sledge.

In building the Hangar, the western wall of the Hut was used for one side; the low southern end and the western wall were constructed of full and empty cases, the lee side was closed with a tarpaulin and blocks of snow and over all was nailed a roof of thick timber—part of the air-tractor's case. To stiffen the whole structure, a small amount of framework, in the form of heavy uprights, was set in the ground. The dimensions inside were thirty-four feet by eleven feet; the height, eleven feet at the northern and six feet at the southern end. As a break-wind a crescent-shaped wall of benzine cases was built several yards to the south. As in the case of the veranda, it was very difficult



Adelie Land

MACCORMICK SKUA GULL ON THE NEST WITH EGG

Harley



Adelie Land

CHICK OF MACCORMICK SKUA GULL ON THE NEST

Harley



Hurley

PROTECTION—ADELIE PENGUIN AND CHICK

AUTUMN PROSPECTS

to make the Hangar impervious to drift; a certain quantity of snow always made its way in, and was duly shovelled out.

Seals had suddenly become very scarce, no doubt disgusted with the continuous winds. Every one that came ashore was shot for food. Unfortunately, the amount of meat necessary for the dogs throughout the winter was so great that dog-biscuits had to be used to eke it out.

Only a few penguins remained by the middle of March. They were all young ones, waiting for the completion of their second moult before taking to the sea. The old feathers hung in untidy tufts, and the birds were often in a wretched plight owing to the wind and drift-snow. Many were added to the bleaching carcasses which fill the crevices or lie in heaps on ancient rookeries among the rocky ridges. None were free from the encumbrance of hard cakes of snow which often covered their eyes or dangled in pendent icicles from their bodies. The result was very ludicrous.

Hurley obtained some excellent photographs of the seals and penguins, as of all other subjects. So good were they that most of us withdrew from competition. His enthusiasm and resourcefulness knew no bounds. Occasional days, during which cameras that had been maltreated by the wind were patched up, were now looked upon as inevitable. One day, when Webb and Hurley were both holding on to the cinematograph camera, they were blown away, with sundry damages all around. It was later in the year when Hurley with his whole-plate camera broke through the sea-ice—a sad affair for the camera.

The good conditions on the 15th lasted only a few hours, and back came the enemy as bad as ever. On the 18th the wind was only thirty miles per hour, giving us an opportunity of continuing the buildings outside. It was only by making the most of every odd hour when the weather was tolerable that our outdoor enterprises made any headway. Sometimes when it was too windy for building we were able to improve our knowledge of the neighbourhood.

A glance at Stillwell's map (page 93) is instructive as to the

THE HOME OF THE BLIZZARD

extent and character of the rocky area. It is devoid of any forms of vegetation sufficiently prominent to meet the casual eye. Soil is lacking, for all light materials and even gravel are carried away by the winds. The bare rock rises up into miniature ridges, separated by valleys largely occupied by ice-slabs and lakelets. Snow fills all the crevices and tails away in sloping ramps on the lee side of every obstacle. In midsummer a good deal thaws, and, re-freezing, is converted into ice. The highest point of the rock is one hundred and forty feet. The seaward margin is deeply indented, and the islets off shore tell of a continuation of the rugged, rocky surface below the sea. On the northern faces of the ridges, fronting the ice-foot, large, yellowish patches mark the sites of penguin rookeries. These are formed by a superficial deposit of guano which never becomes thick, for it blows away as fast as it accumulates. Standing on the shore, one can see kelp growing amongst the rocks even in the shallowest spots, below low-water level.

To the south, the rocks are overridden by the inland ice which bears down upon and overwhelms them. The ice-sheet shows a definite basal moraine, which means that the lowest stratum, about forty feet in thickness, is charged with stones and earthy matter. Above this stratum the ice is free from foreign matter and rises steeply to several hundred feet, after which the ascending gradient is reduced.

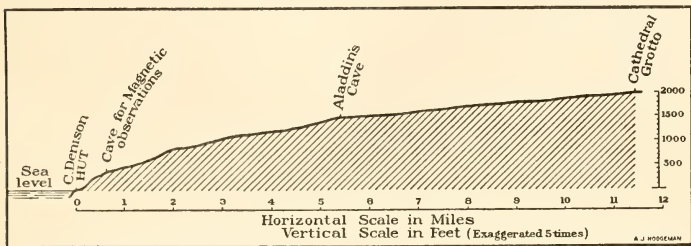
The continental glacier moves down to the sea, regularly but slowly; the rate of movement of some portions of the adjacent coastal ice cliffs was found to be one hundred, feet per annum. The rocky promontory at Winter Quarters, acting as an obstacle, reduces the motion of the ice to an annual rate, measured in inches only. Perhaps the conditions now prevailing are those of a comparative "drought," for there is clear evidence that our small promontory was at one time completely enveloped. In a broad way this is illustrated by the topography, but the final proof came when Stillwell and others discovered rock-faces polished and grooved by the ice.

THE GREY ROCK HILLS OF CAPE DENISON
Paget colour photo by Correll



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Whatever "ice-floods" there may have been in the past, the position of the margin of the glacier must have remained for a long period in its present situation. The evidence for this is found in the presence of a continuous, terminal moraine, at or just in advance of the present ice-front. This moraine, an accumulation of stones of all kinds brought to their present resting-place by the ice-sheet, was in itself a veritable museum. Rocks, showing every variety in colour and form, were assembled, transported from far and wide over the great expanse of the continent.



A section of the coastal slope of the Continental Ice Sheet inland from Winter Quarters, Adelie Land

Stillwell found these moraines a "happy hunting-ground" for the geologist. His plane-table survey and rock collections are practical evidence of work carried out in weather which made it seldom short of an ordeal.

The story of the buried land to the south is in large measure revealed in the samples brought by the ice and so conveniently dumped. Let us swiftly review the operations leading to the deposition of this natural museum.

As the ice of the hinterland moves forward, it plucks fragments from the rocky floor. Secure in its grip, these are used as graving-tools to erode its bed. Throwing its whole weight upon them it grinds and scratches, pulverizes and grooves. The rocky basement is gradually reduced in level, especially the softer regions. The tools are faceted, polished and furrowed, for ever moving onwards. Finally,

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the rock-powder or "rock-flour," as it is termed, and the boulders, thenceforth known as "erratics," arrive at the terminal ice-face. Here, the melting due to the sun's heat keeps pace with the "on-thrust" and some of the erratics may remain stationary, or else, floating in the sea, a berg laden with boulders breaks off and deposits its load in the depths of the ocean. Each summer the ice-face above the rocks at Winter Quarters thawed back a short distance and the water ran away in rivulets, milky-white on account of the "rock-flour" in suspension. The pebbles and boulders too heavy to be washed away remained behind to form the moraine.

The "erratics" comprised a great variety of metamorphic and igneous rocks, and, on a more limited scale, sedimentary types. Amongst the latter were sandstones, slates, shales and limestones.

Apart from the moraines, the rock exposed *in situ* was mainly a uniform type of gneiss, crumpled and folded, showing all the signs of great antiquity—pre-Cambrian, in the geological phrase. Relieving the grey sheen of the gneiss were dark bands of schist which tracked about in an irregular manner. Sporadic quartz veins here and there showed a light tint. They were specially interesting, for they carried some less common minerals such as beryl, tourmaline, garnet, coarse mica and ores of iron, copper and molybdenum. The ores were present in small quantities, but gave promise of larger bodies in the vicinity and indicated the probability of mineral wealth beneath the continental ice-cap.



Adelie Land

THE LOWER MORaine, COMPOSED OF WATER-WORN
BOULDERS, CAPE DENISON

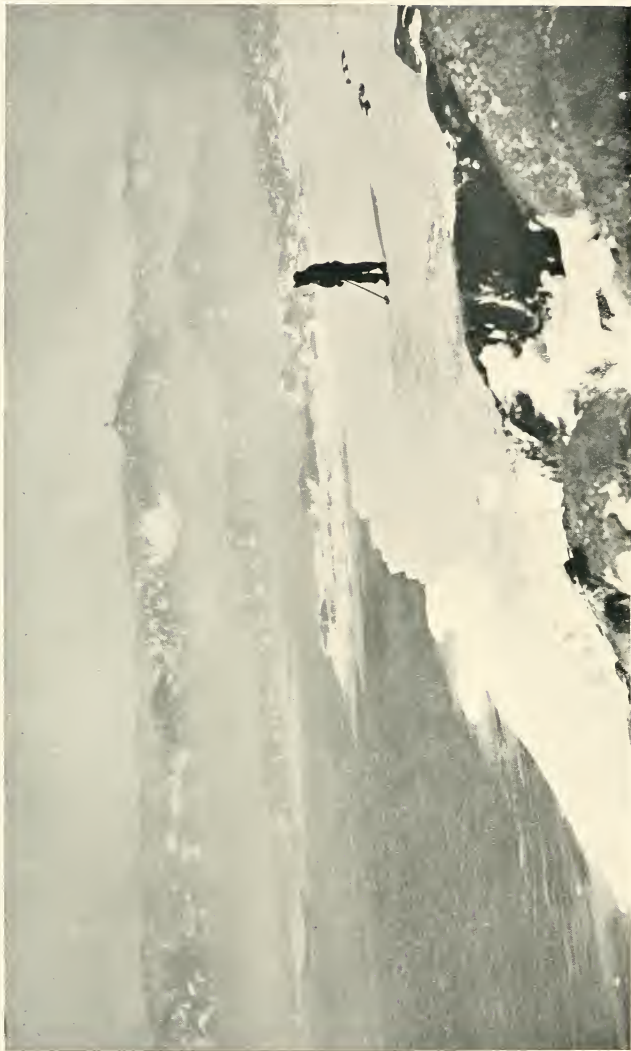
Hurley



Adelie Land

AN ICE-POLISHED SURFACE, CAPE DENISON

Hurley



THE BOAT HARBOUR IN MARCH. THE HUT IS SEEN DIMLY THROUGH LIGHT DRIFT

CHAPTER VII

THE BLIZZARD

THE equinox arrived, and the only indication of settled weather was a more marked regularity in the winds. Nothing like it had been reported from any part of the world. Any trace of elation we may have felt at this meteorological discovery could not compensate for the ever-present discomforts of life. Day after day the wind fluctuated between a gale and a hurricane. Overcast skies of heavy nimbus cloud were the rule and the air was continually charged with drifting snow.

Lulls of a singular nature occasionally relieved the monotony. During these visitations the sequence of events could almost be predicted; indeed, they would often occur at the same time on several succeeding days.

On March 19 the first well-marked lull intervened at the height of a gale. On that day the wind, which had been blowing with great force during the morning, commenced to subside rapidly just after noon. Towards evening, the air about the Hut was quite still except for gusts from the north and rather frequent "whirlies."

This was the name adopted for whirlwinds of a few yards to a hundred yards or more in diameter which came to be regarded as peculiar to the country. Similar disturbances have been observed in every part of the world, but seldom possessed of the same violence and regularity as is the case in Adelie Land.

The whirlies tracked about in a most irregular manner and woe betide any light object which came in their path. The velocity of the wind in the rotating column being very

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great, a corresponding lifting power was imparted to it. As an illustration of this force, it may be mentioned that the lid of the air-tractor case had been left lying on the snow near the Hut. It weighed more than three hundredweights, yet it was whisked into the air one morning and dropped fifty yards away in a north-easterly direction. An hour afterwards it was picked up again and returned near its original position, this time striking the rocks with such force that part of it was shivered to pieces. Webb and Stillwell watched the last proceeding at a respectful distance.

Again, the radius of activity of these whirlies was strictly limited; objects directly in their path only being disturbed. For instance, Laseron one day was skinning at one end of a seal and remained in perfect calm, while McLean, at the other extremity, was on the edge of a furious vortex.

Travelling over the sea the whirlies displayed fresh capabilities. Columns of brash-ice, frozen spray and water-vapour were frequently seen lifted to heights of from two hundred to four hundred feet, simulating water spouts.

Reverting to the afternoon of March 19. Beyond the strange stillness of the immediate vicinity, broken occasionally by the tumult of a passing, wandering whirly, an incessant, seething roar could be heard. One could not be certain from whence it came, but it seemed to proceed either from the south or overhead. Away on the icy promontories to the east and west, where the slopes were visible, mounting to an altitude of several thousand feet, clouds of drift-snow blotted out the details of the surface above a level of about six hundred feet. It certainly appeared as if the gale, for some reason, had lifted and was still raging overhead. At 7.30 P.M. the sound we had heard, like the distant lashing of ocean waves, became louder. Soon gusts swept the tops of the rocky ridges, gradually descending to throw up the snow at a lower level. Then a volley raked the Hut, and within a few minutes we were once more enveloped in a sea of drifting snow, and the wind blew stronger than ever.

The duration of the lulls was ordinarily from a few

THE BLIZZARD

minutes to several hours ; that of March 19 was longer than usual. In the course of time, after repeated observations, much light was thrown on this phenomenon. On one occasion, a party ascending the ice slopes to the south met the wind blowing at an elevation of four hundred feet. At the same time snow could be seen pouring over the "Barrier" to the west of the Winter Quarters, and across a foaming turmoil of water. This was evidently the main cause of the seething roar, but it was mingled with an undernote of deeper tone from the upland plateau—like the wind in a million tree-tops.

In the early spring, while we were transporting provisions to the south, frequent journeys were made to higher elevations. It was then established that even when whole days of calm prevailed at the Hut, the wind almost without exception blew above a level of one thousand feet. On such occasions it appeared that the gale was impelled to blow straight out from the plateau slopes over a lower stratum of dead-air. An explanation was thereby afforded of the movement of condensation clouds which appeared in the zenith at these times. A formation of delicate, gauzy clouds developed at a low altitude, apparently in still air, but doubtless at the base of a hurricane stratum. Whirling round rapidly in eddying flocculi, they quickly tailed away to the north, evaporating and disappearing.

The auditory sense was strangely affected by these lulls. The contrast was so severe when the racking gusts of an abating wind suddenly gave way to intense, eerie silence, that the habitual droning of many weeks would still reverberate in the ears. At night one would involuntarily wake up if the wind died away, and be loth to sleep "for the hunger of a sound." In the open air the stillness conveyed to the brain an impression of audibility, interpreted as a vibratory murmur.

During one hour on March 22 it blew eighty-six miles. On the morning of that day there was not much snow in the air and the raging sea was a fearful sight. Even

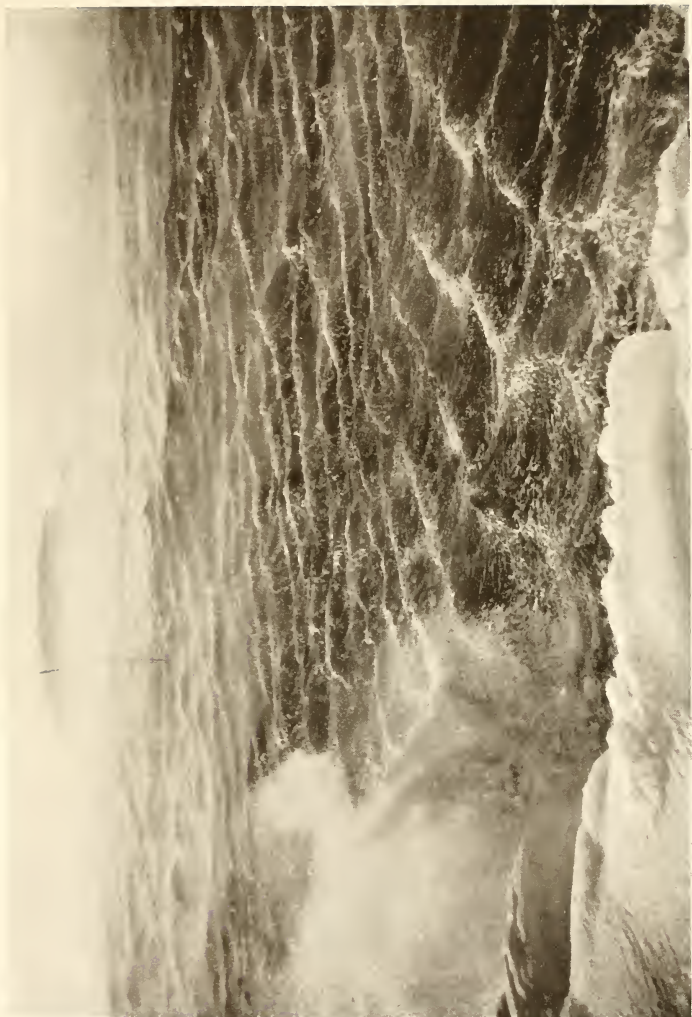
THE HOME OF THE BLIZZARD

the nearest of the islands, only half a mile off the land, was partially hidden in the clouds of spray. What an impossible coast this would be for the wintering of a ship!

Everybody knows that the pressure exerted by a wind against an object in its path mounts up in much greater proportion than the velocity of the wind. Thus may be realized the stupendous force of the winds of Adelle Land in comparison with those of half the velocity which fall within one's ordinary experience. As this subject was ever before us, the following figures quoted from a work of reference will be instructive. The classification of winds, here stated, is that known as the "Beaufort scale." The corresponding velocities in each case are those measured by the "Robinson patent" anemometer; our instrument being of a similar pattern.

Beaufort scale.		Velocities in miles per hour.	Pressures in lbs. per square foot of area.	Apparent effect.
0	Calm	2	0.02	May cause smoke to move from the vertical
1	Light air	4	0.06	Moves the leaves of trees
2	Light breeze	7	0.19	Moves small branches of trees and blows up dust
3	Gentle breeze	10	0.37	
4	Moderate breeze	14	0.67	
5	Fresh breeze	19	1.16	Good sailing breeze and makes white caps
6	Strong breeze	25	1.90	Sways trees and breaks small branches
7	Moderate gale	31	2.81	
8	Fresh gale	37	3.87	
9	Strong gale	44	5.27	Dangerous for sailing-vessels
10	Whole gale	53	7.40	
11	Storm	61	10.40	Prostrates exposed trees and frail houses
12	Hurricane	77	14.40	

Beyond the limits of this scale, the pressures exerted rise very rapidly. A wind recorded as blowing at the rate of a hundred miles per hour exerts a pressure of about twenty-three pounds per square foot of surface exposed to it.



“RACE OF THE SPRAY-SMOKE’S HURLING SHEET”

Hodley



Adelie Land

WALKING AGAINST A STRONG WIND

Hurley



Adelie Land

PICKING ICE FOR DOMESTIC PURPOSES IN A HURRICANE WIND. NOTE THE HIGH ANGLE AT WHICH WEBB IS LEANING ON THE WIND

Hurley

THE BLIZZARD

Wind above eighty miles per hour is stated to "prostrate everything."

The mileages registered by our anemometer were the mean for a whole hour, neglecting individual gusts, whose velocity much exceeded the average and which were always the potent factors in destructive work.

Obviously the greatest care had to be taken to secure everything. Still, articles of value were occasionally missed. They were usually recovered, caught in crevices of rock or amongst the broken ice. Northward from the Hut there was a trail of miscellaneous objects scattered among the hummocks and pressure-ridges out towards Penguin Hill on the eastern side of the boat harbour: tins of all kinds and sizes, timber in small scraps, cases and boards, paper, ashes, dirt, worn-out finnesko, ragged mitts and all the other details of a rubbish heap. One of the losses was a heavy case which formed the packing of part of the magnetometer. Weighted down by stones this had stood for a long time in what was regarded as a safe place. One morning it was discovered to be missing. It was surmised that a hurricane had started it on an ocean voyage during the previous day. Boxes in which Whetter used to carry ice for domestic requirements were as a rule short-lived. His problem was to fill the boxes without losing hold of them, and the wind often gained the ascendancy before a sufficient ballast had been added. We sometimes wondered whether any of the flotsam thus cast upon the waters ever reached the civilized world.

Whatever has been said relative to the wind-pressure exerted on inanimate objects, the same applied, with even more point, to our persons; so that progression in a hurricane became a fine art. The first difficulty to be encountered was a smooth, slippery surface offering no grip for the feet. Stepping out of the shelter of the Hut, one was apt to be immediately hurled at full length down wind. No amount of exertion was of any avail unless a firm foothold had been secured. The strongest man, stepping on to ice or hard snow in plain leather or fur boots, would start sliding away with

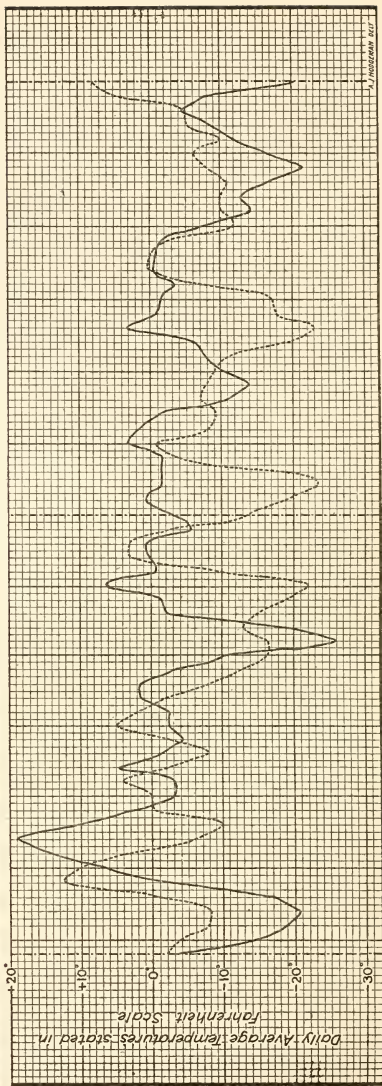
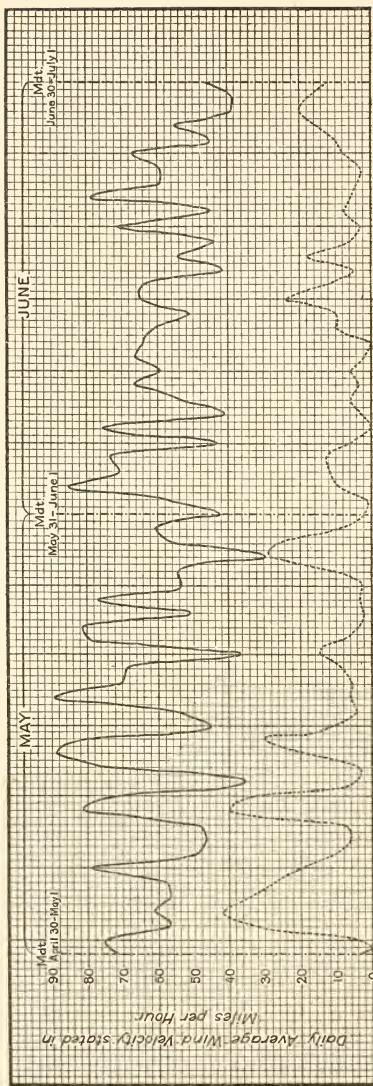
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gradually increasing velocity ; in the space of a few seconds, or earlier, exchanging the vertical for the horizontal position. He would then either stop suddenly against a jutting point of ice, or glide along for twenty or thirty yards till he reached a patch of rocks or some rough sastrugi.

Of course we soon learned never to go about without crampons on the feet. Many experiments in the manufacture of crampons were tried with the limited materials at our disposal. Those designed for normal Antarctic conditions had been found unserviceable. A few detachable pairs made of wrought iron with spikes about one and a half inches in length, purchased in Switzerland, gave a secure foothold. Some of the men covered the soles of their boots with long, bristling spikes and these served their purpose well. Ice-nails, screwed into the soles without being riveted on plates, were liable to tear out when put to a severe test, besides being too short. Spikes of less than an inch in length were inadequate in hurricanes. Nothing devised by us gave the grip of the Swiss crampons, but, to affix them, one had to wear leather boots, which, though padded to increase their warmth, had to be tightly bound by lashings compressing the feet and increasing the liability to frost-bite.

Shod with good spikes, in a steady wind, one had only to push hard to keep a sure footing. It would not be true to say "to keep erect," for equilibrium was maintained by leaning against the wind. In course of time, those whose duties habitually took them out of doors became thorough masters of the art of walking in hurricanes—an accomplishment comparable to skating or skiing. Ensneced in the lee of a substantial break-wind, one could leisurely observe the unnatural appearance of others walking about, apparently in imminent peril of falling on their faces.

Experiments were tried in the steady winds ; firmly planting the feet on the ground, keeping the body rigid and leaning over on the invisible support. This "lying on the wind," at equilibrium, was a unique experience. As a rule the velocity remained uniform ; when it fluctuated in a series



A COMPARISON OF WIND-VELOCITIES AND TEMPERATURES PREVAILING AT CAPE ROYDS, MCMURDO SOUND, AND AT WINTER QUARTERS, ADELIE LAND, DURING THE MONTHS OF MAY AND JUNE.

At the time of plotting only the above two months were available, but they are sufficient to illustrate the unusually severe weather conditions of Adelie Land. The data for Cape Royds is that supplied by the Shackleton Expedition, and for Adelie Land, the broken line to Cape Royds. It will be noted that the average temperature is nearly similar at both stations, only on three days during the period did the average wind velocity at Cape Royds reach that of the lowest daily value of Adelie Land.

THE BLIZZARD

of gusts, all our experience was likely to fail, for no sooner had the correct angle for the maximum velocity been assumed than a lull intervened—with the obvious result.

Before the art of “hurricane-walking” was learnt, and in the primitive days of ice-nails and finnesko, progression in high winds degenerated into crawling on hands and knees. Many of the more conservative persisted in this method, and, as a compensation, became the first exponents of the popular art of “board-sliding.” A small piece of board, a wide ice flat and a hurricane were the three essentials for this new sport.

Wind alone would not have been so bad; drift snow accompanied it in overwhelming amount. In the autumn overcast weather with heavy falls of snow prevailed, with the result that the air for several months was seldom free from drift. Indeed, during that time, there were not many days when objects a hundred yards away could be seen distinctly. Whatever else happened, the wind never abated, and so, even when the snow had ceased falling and the sky was clear, the drift continued until all the loose accumulations on the hinterland, for hundreds of miles back, had been swept out to sea. Day after day deluges of drift streamed past the Hut, at times so dense as to obscure objects three feet away, until it seemed as if the atmosphere were almost solid snow.

Picture drift so dense that daylight comes through dully, though, maybe, the sun shines in a cloudless sky; the drift is hurled, screaming through space at a hundred miles an hour, and the temperature is below zero, Fahrenheit.* You have then the bare, rough facts concerning the worst blizzards of Adelie Land. The actual experience of them is another thing.

Shroud the infuriated elements in the darkness of a

* Temperatures as low as -28° F. (60° below freezing-point) were experienced in hurricane winds, which blew at a velocity occasionally exceeding one hundred miles per hour. Still air and low temperatures, or high winds and moderate temperatures, are well enough; but the combination of high winds and low temperatures is difficult to bear.

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polar night, and the blizzard is presented in a severer aspect. A plunge into the writhing storm-whirl stamps upon the senses an indelible and awful impression seldom equalled in the whole gamut of natural experience. The world a void, grisly, fierce and appalling. We stumble and struggle through the Stygian gloom; the merciless blast—an incubus of vengeance—stabs, buffets and freezes; the stinging drift blinds and chokes. In a ruthless grip we realize that we are

poor windlestraws

On the great, sullen, roaring pool of Time.

It may well be imagined that none of us went out on these occasions for the pleasure of it. The scientific work required all too frequent journeys to the instruments at a distance from the Hut, and, in addition, supplies of ice and stores had to be brought in, while the dogs needed constant attention.

Every morning, Madigan visited all the meteorological instruments and changed the daily charts; at times having to feel his way from one place to the other. Attending to the exposed instruments in a high wind with low temperature was bad enough, but with suffocating drift difficulties were increased tenfold.

Around the Hut there was a small fraternity who chose the outside veranda as a rendezvous. Here the latest gossip was exchanged, and the weather invariably discussed in forcible terms. There was Whetter, who replenished the water-supply from the unfailing fountain-head of the glacier. For cooking, washing clothes and for photographic and other purposes, eighteen men consumed a good deal of water, and, to keep up with the demand, Whetter piled up many hardly-won boxes of ice in the veranda. Close unearthed coal briquettes from the heap outside, shovelled tons of snow from the veranda and made himself useful and amiable to every one. Murphy, our stand-by in small talk, travel, history, literature and what not, was the versatile storeman. The store in the veranda was continually invaded by similar snow to that which covered the provision boxes outside.

THE BLIZZARD

To keep the veranda cleared, renew the supplies and satisfy the demands of the kitchen required no other than Murphy. Ninnis and Mertz completed the "Veranda Club," to which honorary members from within the Hut were constantly being added.

The meteorological instruments, carefully nursed and housed though they were, were bound to suffer in such a climate. Correll, who was well fitted out with a lathe and all the requirements for instrument-making, attended to repairs, doing splendid service. The anemometer gave the greatest trouble, and, before Correll had finished with it, most of the working parts had been replaced in stronger metal.

When the recording sheets of the instruments had been successfully changed, the meteorologist packed them in a leather bag, strapped on his shoulders, so that they would not be lost on the way to the Hut. As soon as he arrived indoors the bag was opened and emptied; the papers being picked out from a small heap of snow.

It was a fortunate thing that no one was lost through failing to discover the Hut during the denser drifts. Hodgeman on one occasion caused every one a good deal of anxiety. Among other things, he regularly assisted Madigan by relieving him of outdoor duties on the day after his night-watch, when the chief meteorologist was due for a "watch below." It was in the early autumn—few of us, then, were adepts at finding our way by instinct—that Hodgeman and Madigan set out, one morning, for the anemometer. Leaving the door of the Hut, they lost sight of each other at once, but anticipated meeting at the instrument. Madigan reached his destination, changed the records, waited for a while and then returned, expecting to see his companion at the Hut. He did not appear, so, after a reasonable interval, search-parties set off in different directions.

The wind was blowing at eighty miles per hour, making it tedious work groping about and hallooming in the drift. The sea was close at hand and we realized that, as the wind was

THE HOME OF THE BLIZZARD

directly off shore, a man without crampons was in a dangerous situation. Two men, therefore, roped together and carefully searched round the head of the boat harbour ; one anchoring himself with an ice-axe, whilst the other, at the end of the rope, worked along the edge of the sea. Meanwhile Hodgeman returned to the Hut, unaided, having spent a very unpleasant two hours struggling from one landmark to another, his outer garments filled with snow.

The fact that the wind came steadily from the same direction made it possible to steer, otherwise outdoor operations would not have been conducted so successfully. For instance, Webb, who visited the Magnetograph House, a quarter of a mile distant, at least once a day, made his way between various "beacons" by preserving a definite bearing on the wind. His journeys were rendered all the more difficult because they were frequently undertaken at night.

In struggling along through very dense drifts one would be inclined to think that the presence of the sun was a matter of small concern. As a matter of fact there was, during the day, a good deal of reflected white light and a dark object looms up within a yard or two. In darkness there was nothing to recognize. So Webb would often run by dead reckoning on to the roof of the Hut, and would then feel his way round it till he caught the glimmer of a hurricane lantern coming through the veranda entrance.

I had always the greatest admiration for the unfailing manner in which those responsible for the tidal, magnetic and meteorological work carried out their duties.

As a measure of the enormous amount of drift, we set about constructing a gauge, which, it was hoped, would give us a rough estimate of the quantity passing the Hut in a year. Hannam, following the approved design, produced a very satisfactory contrivance. It consisted of a large drift-tight box, fitted on the windward side with a long metal cone, tapering to an aperture three-quarters of an inch in diameter. The drift-laden air entered the aperture, its speed was checked on entering the capacious body of the gauge and consequently



Adelie Land

LEANING UPON THE WIND; MADIGAN NEAR THE METEOROLOGICAL SCREEN

Hurley



Adelie Land STILLWELL COLLECTING GEOLOGICAL SPECIMENS IN THE WIND

Harley



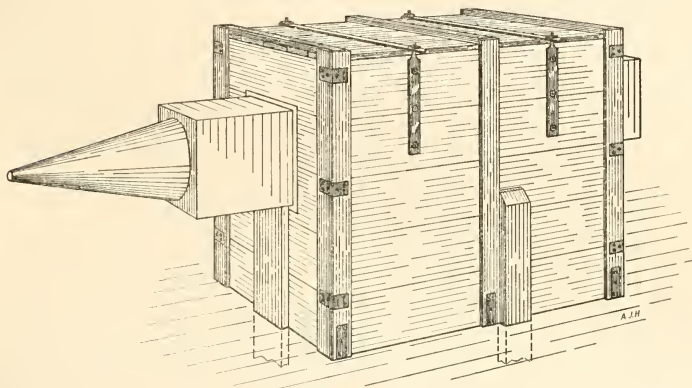
Adelie Land IN THE BLIZZARD: GETTING ICE FOR DOMESTIC PURPOSES
FROM THE GLACIER ADJACENT TO THE HUT

Harley

THE BLIZZARD

the snow fell to the bottom of the box and the air passed out behind through a trap-door. The catch was taken out periodically through a bolted lid, the snow was melted, the resulting water measured and its weight calculated.

In thick drifts, one's face inside the funnel of the burberry helmet became rapidly packed with snow, which, by the warmth of the skin and breath, was changed into a mask of ice. This adhered firmly to the rim of the helmet and to



THE DRIFT GAUGE

the beard and face. The mask became so complete that one had to clear away obstructions continually from the eyes. It was not easy to remove the casing of ice, outside in the wind, because this could only be done slowly, with bare fingers exposed. An experienced man, once inside the Hut, would first see that the ice was broken along the rim of the helmet; otherwise, when it came to be hastily dragged off, the hairs of the beard would follow as well. As soon as the helmet was off the head, the icicles hanging on the beard and glazing the eyelashes were gradually thawed by the fingers and removed. The above treatment was learned by experience.

The abrasion-effects produced by the impact of the snow

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particles were astonishing. Pillars of ice were cut through in a few days, rope was frayed, wood etched and metal polished. Some rusty dog-chains were exposed to it, and, in a few days, they had a definite sheen. A deal box, facing the wind, lost all its painted bands and in a fortnight was handsomely marked; the hard, knotty fibres being only slightly attacked, whilst the softer, pithy laminæ were corroded to a depth of one-eighth of an inch.

The effect of constant abrasion upon the snow's surface is to harden it, and, finally, to carve ridges known as sastrugi. Of these much will be said when recounting our sledging adventures, because they increase so much the difficulties of travelling.

Even hard, blue ice may become channelled and pitted by the action of drift. Again, both névé and ice may receive a wind-polish which makes them very slippery.

Of the effect of wind and drift upon rock, there was ample evidence around Winter Quarters. Regarded from the north, the aspect of the rocks was quite different from that on the southern side. The southern, windward faces were on the whole smooth and rounded, but there was no definite polish, because the surface was partly attacked by the chipping and splitting action of frost. The leeward faces were rougher and more disintegrated. More remarkable still were the etchings of the non-homogeneous banded rocks. The harder portions of these were raised in relief, producing quite an artistic pattern.

In regard to the drift, a point which struck me was the enormous amount of cold communicated to the sea by billions of tons of low-temperature snow thrown upon its surface. The effect upon the water, already at freezing-point, would be to congeal the surface at once. Whilst the wind continued, however, there was no opportunity for a crust to form, the uppermost layers being converted into a pea-soup-like film which streamed away to the north.

A description of the drifts of Adelie Land would not be complete without mentioning the startling electrical

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effects which were sometimes observed. The first record of these was made by McLean, when on night-watch on March 22. While taking the observations at midnight, he noticed St. Elmo's fire, a "brush discharge" of electricity, on the points of the nephoscope. As the weather became colder this curious phenomenon increased in intensity. At any time in the drift, an electroscope exposed outside became rapidly charged. A spark gap in a vacuum, connected with a free end of wire, gave a continuous discharge. At times, when the effects were strong, the night-watchman would find the edges and wire stays of the screen outlined in a fashion reminiscent of a pyrotechnic display or an electric street-advertisement. The corners of boxes and points of rock glowed with a pale blue light. The same appeared over points on the clothing, on the mitts and round the funnel of the helmet. No sensation was transmitted to the body from these points of fire; at least nothing sufficiently acute to be felt, with the drift and wind lashing on the body outside. However, the anemograph several times discharged a continuous stream of sparks into Madigan's fingers while he was changing the records. Once these sparks reached half an inch in length, and, as his fingers were bared for the work, there was no mistaking the feeling.

For regular observations on the subject, Correll fixed a pointed collector—a miniature lightning-conductor—above the flagpole on the summit of the roof. A wire was led through an insulator, so that the stream of electricity could be subjected to experiment in the Hut. Here a "brush" of blue light radiated outwards to a distance of one inch. When a conductor was held close to it, a rattling volley of sparks immediately crossed the interval and the air was pervaded with a strong smell of ozone. Of course sparks were not always being emitted by the collector, and it was important to determine the periods of activity. To ensure this, Hurley devised an automatic arrangement, so that an electric bell was set ringing whenever a current was passing; the night-watchman would then note the fact in the

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log-book. However, the bell responded so often and so vigorously that it was soon dismantled for the benefit of sleepers. It was singular that the "brush discharge" was sometimes most copious when the atmosphere was filled with very fine drift, and not necessarily during dense drift.

After what has been said, it will be obvious that the drift-laden hurricanes of the country were more than ordinarily formidable. They scarcely seemed to provide a subject for poetic inspiration; still the following effusion appeared by McLean, Editor of the *Adelie Blizzard*:—

THE BLIZZARD

A snow-hush brooding o'er the grey rock-hills!
A world of silence, ominous, that fills
The wide seascape of ice-roofed islands, rolls
To ether-zones that gird the frigid Poles!

Realm of purest alabaster-white,
Wreathed in a vast infinitude of light;
The royal orb swings to thy summer gaze
A glitt'ring azure world of crystal days.

The lorn bird-voices of an unseen land—
No hue of forest, gleam of ocean sand—
Rise in a ceaseless plaint of raucous din,
On northern tides the bergs come floating in.

The wind-sprites murmuring in hinter-snow—
The pent heart-throbbings of the wan plateau—
Wing through the pulsing-spell thrown o'er the sea,
In wild and shrieking blizzard minstrelsy.

Swirl of the drift-cloud's shimm'ring sleet;
Race of the spray-smoke's hurtling sheet;
Swelling trail of the streaming, sunbright foam,
Wafting sinuous brash to an ice-field home.

Eddy-wraiths o'er the splintered schist—
Torrent spume down the glacier hissed!
Throbbing surge of the ebbing seaward gust,
Raping stillness vast in its madd'ning lust.

Lotus-floe 'neath the Barrier brink,
Starting sheer—a marble blink—
Pelting shafts from the show'ring arrow-blast
Strike—in the blackened flood seethe riven past.

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Glow of the vibrant, yellow west
Pallid fades in the dread unrest.
Low'ring shades through the fury-stricken night
Rack the screaming void in shudd'ring might.

Requiem peace from the hinter-snows
Soft as river music flows.
Dawn in a flushing glamour tints the sea ;
Serene her thrill of rhythmic ecstasy.

Sledging was out of the question. Indeed, we recognized how fortunate we were not to have pushed farther south in March. Had we advanced, it is more than likely that provisions would have been exhausted before we could have located the Hut in the sea of drift. Our hopes were now centred on midwinter calms.

Looking through my diary, I notice that on March 24, "we experienced a rise in spirits because of the improved weather." I find the average velocity of the wind for that day to have been forty-five miles per hour, corresponding to a "strong gale" on the Beaufort scale. This tells its own story.

When the high wind blew off shore, there was no backswell, on account of the pack-ice to the north quelling the sea. The arrival of a true ocean swell meant that the pack had been dispersed. On March 24 such appears to have been the case, for then, during the day, a big northerly swell set in, dashing over the ice-foot and scattering seaweed on the rocks.

After the equinox, the temperatures remained in the vicinity of zero, Fahrenheit. The penguins took to the sea, and, save for the glimpse of an occasional petrel on the wing, the landscape was desolate.

It was high time that our programme of construction was completed, but, however much we tried, it was impossible to do a great deal in winds exceeding fifty miles an hour. By taking advantage of days freest from drift, the exterior of the Hangar was completed by April 6. After the air-tractor sledge had been moved inside, the snow was

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piled so high on the leeward face, that the shelter became naturally blocked with a rampart of snow which served admirably in place of the wall of tarpaulin which we originally intended to use.

Bickerton could now proceed at leisure to make any necessary alterations. The Hangar was also used as a store for many articles which had been crowded into odd corners or rescued from the snow outside. To increase its size, tunnels were afterwards driven into the bank of snow and timber was stowed in these so as to be safe from burial and loss.

The building was finished just in the nick of time. Snow came down so thickly that had the falls occurred a few days earlier, the cases from which the place was constructed would have been effectually buried and the construction made an impossibility.

But for the wind, the Hut would have been lost to sight. Still, it was completely surrounded by massive drifts, and the snow was driven by the wind past the canvas flap and through the entrance, until the veranda became choked.

Close, who was night-watchman during the early morning hours of April 7, had the greatest difficulty in getting outside to attend to his duties. To dig his way through the entrance, reach the instruments and to return occupied a whole hour.

We were inundated with snow; even a portion of the roof was buried. The situation required immediate attention; so it was decided to make a tunnel connecting the entrance veranda with the store veranda. From the north-western end of the latter, an out-draught had established itself, preserving a vertical funnel-like opening in the snow bank, always free for entrance or exit. This proved a fortunate accident.

Further, a second tunnel, over twenty feet in length, was driven out from the original entrance with a view to reaching the surface at a point beyond the lee of the Hut. It was thought that the scouring effect of the wind, there,



Adelie Land

Harley

AN INCIDENT IN MARCH SOON AFTER THE COMPLETION OF THE HUT:
HODGEMAN, THE NIGHT WATCHMAN, RETURNING FROM HIS ROUNDS
OUTSIDE, PUSHES HIS WAY INTO THE VERANDA THROUGH THE
RAPIDLY ACCUMULATING DRIFT SNOW



Harley
MERTZ IN THE SNOW TUNNELS ON HIS WAY TO THE INTERIOR OF THE HUT
WITH A BOX OF ICE FOR THE MELTERS



MERTZ EMERGING FROM THE TRAP-DOOR IN THE ROOF *Harley*

THE BLIZZARD

would keep the opening of the tunnel free of drift. But when completed, it filled rapidly with snow and had to be sealed. It was then used to receive slop-water. While the fever for excavation was at its height, Whetter drove, as an off-shoot to the first, another tunnel which came to be used as a nursery for the pups.

At this stage, to leave the Hut, it was necessary to crawl through a low trap-door in the wall of the inside or entrance veranda; the way then led to the connecting tunnel and onwards to the store veranda; finally one climbed through a manhole in the snow into the elements without. From the store veranda there was access to the Hangar by a hinged door in the common wall, and, as an additional convenience, a trap-door was made in the roof of the inner veranda to be used during spells of clear weather or in light drift.

The old landmarks became smothered in snow, making the Hut's position a matter of greater uncertainty. A journey by night to the magnetic huts was an outing with a spice of adventure.

Climbing out of the veranda, one was immediately swallowed in the chaos of hurtling drift, the darkness sinister and menacing. The shrill wind fled by—

. . . the noise of a drive of the Dead,
Striving before the irresistible will
Through the strange dusk of this, the Debatable land
Between their place and ours.

Unseen wizard hands clutched with insane fury, hacked and harried. It was "the raw-ribbed Wild that abhors all life, the Wild that would crush and rend."

Cowering blindly, pushing fiercely through the turmoil, one strove to keep a course to reach the rocks in which the huts were hidden—such and such a bearing on the wind—so far. When the rocks came in sight, the position of the final destination was only deduced by recognising a few surrounding objects.

On the return journey, the vicinity of the Hut would

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be heralded by such accidents as tripping over the "wireless" ground wires or kicking against a box or a heap of coal briquettes. These clues, properly followed up, would lead to the Hut itself, or at least to its shelving roof. In the very thick drifts it was even possible to stand on portions of the roof without any notion of the fact. Fossicking about, one kept on the alert for the feel of woodwork. When found and proved to be too extensive to be a partially buried box, it might safely be concluded to be some part of the roof, and only required to be skirted in order to reach the vertical entrance. The lost man often discovered this pitfall by dropping suddenly through into the veranda.

At the entrance to the tunnel, the roar of the tempest died away into a rumble, the trap-door opened and perhaps the strains of the gramophone would come in a kind of flippant defiance from the interior. Passing through the vestibule and work-room one beheld a scene in utter variance with the outer hell. Here were warm bunks, rest, food, light and companionship—for the time being, heaven! Outside, the crude and naked elements of a primitive and desolate world flowed in writhing torrents.

The night-watchman's duty of taking the meteorological observations at the screen adjacent to the Hut was a small matter compared with the foregoing. First of all, it was necessary for him to don a complete outfit of protective clothing. Dressing and undressing were tedious, and absorbed a good deal of time. At the screen, he would spend a lively few minutes wrestling in order to hold his ground, forcing the door back against the pressure of wind, endeavouring to make the light shine on the instruments, and, finally, clearing them of snow and reading them. For illumination a hurricane lantern wrapped in a calico wind-shield was first used, to be displaced later by an electrical signalling-lamp and, while the batteries lasted, by a light permanently fixed by Hannam in the screen itself. To assist in finding the manhole on his

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WINTER QUARTERS, ADELIE LAND

Paget colour photo by Correll



THE BLIZZARD

return, the night-watchman was in the habit of leaving a light burning in the outer veranda.

I remember waking up early one morning to find the Hut unusually cold. On rising, I discovered Hurley also awake, busy lighting the fire which had died out. There was no sign of Correll, the night-watchman, and we found that the last entry in the log-book had been made several hours previously. Hurley dressed in full burberrys and went out to make a search, in which he was soon successful.

It appeared that Correll, running short of coal during the early morning hours, had gone out to procure some from the stack. While he was returning to the entrance, the wind rolled him over a few times, causing him to lose his bearings. It was blowing a hurricane, the temperature was -7° F., and the drift-snow was so thick as to be wall-like in opacity. He abandoned his load of coal, and, after searching about fruitlessly for some time in the darkness, he decided to wait for dawn. Hurley found him about twenty yards from the back of the Hut.

The suppression of outdoor occupations reacted in an outburst of indoor work. The smaller room had been well fitted up as a workshop, and all kinds of schemes were in progress for adapting our sledging-gear and instruments to the severe conditions. Correll worked long hours to keep up with the demands made upon him. Nobody was idle during the day, for, when there was nothing else to be done, there always remained the manufacture and alteration of garments and crampons.

As soon as the wind abated to a reasonable velocity, there was a rush to the outside jobs. Lulls would come unexpectedly, activity inside ceased, and the Hut, as seen by a spectator, resembled an ants' nest upon which a strange foot had trodden: eighteen men swarming through the manhole in rapid succession, hurrying hither and thither.

The neighbouring sea still remained free from an ice-crust. This, of course, did not mean that freezing was not going on continuously. On the contrary, the chilling

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was no doubt accelerated, but the bulk of the ice was carried off to the north as fast as it was formed. Quantities, however, remained as ground-ice, anchored to the kelp and stones on the bottom. Gazing down through the clear waters one saw a white, mamillated sheath covering the jungle of giant seaweed, recalling a forest after a heavy snowfall. The ice, instead of being a dead weight bearing down the branches, tended to float, and, when accumulated in large masses, sometimes succeeded in rising to the surface, uprooting and lifting great lengths of seaweed with it. One branching stem, found floating in the harbour, measured eighteen feet in length.

Whenever a temporary calm intervened, a skin of ice quickly appeared over the whole surface of the water. In the early stages, this formation consisted of loose, blade-like crystals, previously floating freely below the surface and rising by their own buoyancy. At the surface, if undisturbed, they soon became cemented together. For example, during a calm interval on April 6, within the interval of an hour, an even crust, one inch thick, covered the sea. But the wind returned before the ice was sufficiently strong to resist it, and it all broke up and drifted away to the north, except a piece which remained wedged firmly between the sides of the boat harbour.

In the calm weather, abundant "worms" freely swimming, jelly-fish, pteropods and small fish were observed. Traps were lowered along the edge of the harbour-ice and dredgings were made in every possible situation. The bulk of the biological collecting was effected under circumstances in which Hunter and Laseron might well have given up work in disgust. For instance, I noted in my diary that on May 16, with an off shore wind of forty-three miles per hour, they and several others were dredging from the edge of the slippery bay-ice. The temperature at the time was -2° F.

During April the head of the boat harbour froze over permanently, the ice reaching a thickness of eighteen inches in ten days. By that time it was strong enough to be



WORKING IN THE HURRICANE WIND, ADELIE LAND

Harley



GETTING ICE FOR DOMESTIC PURPOSES. WHETTER PICKING;
MADIGAN WITH THE ICE-BOX

Harley

THE BLIZZARD

suitable for a tide-gauge. This was one of Bage's charges, destined to take him out for many months in fair and foul weather.

There were several occasions in April when the velocity of the wind exceeded ninety miles an hour. On the evening of the 26th, the wind slackened, and for part of the 27th had almost fallen to a calm. This brought the optimists to the fore, once again, with the theory that the worst was over. The prediction was far from being fulfilled, for, as the days passed, the average velocity steadily rose. On May 11 the average for the twenty-four hours was eighty miles per hour. By that time the Hut had been further protected by a crescent of cases, erected behind the first break-wind. In height this erection stood above the Hangar, and, when the snow became piled in a solid ramp on the leeward side, it was more compact than ever. Inside the Hut extra struts were introduced, stiffening the principal rafters on the southern side. It was reassuring to know that these precautions had been taken, for, on May 15, the wind blew at an average velocity of ninety miles per hour throughout the whole twenty-four hours.

Having failed to demolish us by dogged persistence, the hurricane tried new tactics on the evening of May 24, in the form of a terrific series of Herculean gusts. As we learned afterwards, the momentary velocity of these doubtless approached two hundred miles per hour. At 11.30 P.M. the situation was cheerfully discussed, though every one was tuned up to a nervous pitch as the Hut creaked and shuddered under successive blows. It seemed very doubtful whether the roof would resist the gusts, and the feasibility of the meat cellar as a last haven of refuge was discussed. After the passage of each gust, the barometer dropped, rising again immediately afterwards. Similar pulsations of the barometer were observed many times later in the year. The maximum sudden movement noted was one-fifth inch. Had the interior of the Hut been more freely in communication with the outside air, instead of resembling a hermetically

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sealed box, the "kicks" would undoubtedly have been much greater.

Cyclonic gusts were repeated a few days after, when the upper tiers of boxes composing the break-wind were thrown down and pebbles from the moraine were hurled on the roof. The average velocity of the wind for each of the three autumn months was as follows : March, 49 miles per hour ; April, 51·5 miles per hour, and May 60·7 miles per hour.

On May 1 the temperatures became lower, so that it was difficult to move about in the gales without the face getting frost-bitten. Our usual remedy when this occurred was to hold a mitt over the part affected ; thus sheltered, its circulation of blood was soon re-established, unless the cold were very intense. In the extremities—the fingers and toes—warmth was not so easily restored.

Returning from attending the instruments at noon on May 22, Madigan, according to the usual habit, before taking off his wind-proof clothes, commenced clearing away the ice adhering to his helmet and face. One white patch refused to leave the side of his face, until some one observed that it was a frost-bite, and acquainted him of the fact. Frost-bites that day were excusable enough, for the wind was blowing between ninety-five and hundred miles per hour, there was dense drifting snow and a temperature of -28° F.

We had found an accursed country. On the fringe of an unspanned continent along whose gelid coast our comrades had made their home—we knew not where—we dwelt where the chill breath of a vast, Polar wilderness, quickening to the rushing might of eternal blizzards, surged to the northern seas. Already, and for long months we were beneath "frost-fettered Winter's frown."



Adelie Land

THE ICE-CLIFF COASTLINE EAST OF WINTER QUARTERS

Hurley



Adelie Land

MADIGAN'S FROSTBITTEN FACE

Harley

CHAPTER VIII

DOMESTIC LIFE

OUR hearth and home was the living Hut and its focus was the stove. Kitchen and stove were indissolubly linked, and beyond their pale was a wilderness of hanging clothes, boots, finnesko, mitts and what not, bounded by tiers of bunks and blankets, more hanging clothes and dim photographs between the frost-rimed cracks of the wooden walls.

One might see as much in the first flicker of the acetylene through a maze of hurrying figures, but as his eyes grew accustomed to the light, the plot would thicken: books orderly and disorderly, on bracketed shelves, cameras great and small in motley confusion, guns and a gramophone-horn, serpentine yards of gas-tubing, sewing machines, a microscope, rows of pint-mugs, until—thud! he has obstructed a wild-eyed messman staggering into the kitchen with a box of ice.

The wilderness was always inhabited, so much so that it often became a bear-garden in which raucous good humour prevailed over everything.

Noise was a necessary evil, and it commenced at 7.30 A.M., with the subdued melodies of the gramophone, mingled with the stirring of the porridge-pot and the clang of plates deposited none too gently on the table. At 7.50 A.M. came the stentorian: "Rise and shine!" of the night-watchman, and a curious assortment of cat-calls, beating on pots and pans and fragmentary chaff. At the background, so to speak, of all these sounds was the swishing rush of the wind and the creaking strain of the roof, but these had become

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neglected. In fact, if there were a calm, every one was restless and uneasy.

The seasoned sleeper who survived the ten minutes' bombardment before 8 o'clock was an unusual person, and he was often the Astronomer Royal. Besides his dignified name he possessed a wrist-watch, and there was never a movement in his mountain of blankets until 7.59 A.M., unless the jocular night-watchman chose to make a heap of them on the floor. To calls like "Breakfast all ready! Porridge on the table getting cold!" seventeen persons in varying stages of wakefulness responded. No one was guilty of an elaborate toilet, water being a scarce commodity. There were adherents of the snow-wash theory, but these belonged to an earlier and warmer epoch of our history.

For downright, tantalizing cheerfulness there was no one to equal the night-watchman. While others strove to collect their befuddled senses, this individual prated of "wind eighty miles per hour with moderate drift and brilliant St. Elmo's fire." He boasted of the number of garments he had washed, expanded vigorously on bread making—his brown, appetizing specimens in full public view—told of the latest escapade among the dogs, spoke of the fitful gleams of the aurora between 1.30 and 2 A.M., of his many adventures on the way to the meteorological screen and so forth; until from being a mere night-watchman he had raised himself to the status of a public hero. For a time he was most objectionable, but under the solid influence of porridge, tinned fruit, fresh bread, butter and tea and the soothing aroma of innumerable pipes, other public heroes arose and ousted this upstart of the night. Meanwhile, the latter began to show signs of abating energy after twelve hours' work. Soon some wag had caught him having a private nap, a whispered signal was passed round and the unfortunate hero was startled into life with a rousing "Rise and shine!" in which all past scores were paid off.



CORRELL



BAGE



MCLEAN



HODGEMAN



HUNTER



BICKERTON

Harley



Adelie Land

Hurley

A WINTER AFTERNOON SCENE IN THE HUT. FROM THE LEFT: MERTZ, McLEAN, MADIGAN, HUNTER, HODGEMAN. HIGH ON THE LEFT IS THE ACETYLENE GENERATOR



Adelie Land

Hurley

TAKING A TURN IN THE KITCHEN DEPARTMENT. HUNTER, HODGEMAN, BAGE. THE DOORWAY ON THE RIGHT IS THE ENTRANCE TO THE WORK-ROOM

DOMESTIC LIFE

Every one was at last awake and the day began in earnest. The first hint of this came from the messman and cook who commenced to make a Herculean sweep of the pint-mugs and tin plates. The former deferentially proceeded to scrape the plates, the master-cook presiding over a tub of boiling water in which he vigorously scoured knives, forks and spoons, transferring them in dripping handfuls to the cleanest part of the kitchen-table. Cooks of lyric inclination would enliven the company with the score of the latest gramophone opera, and the messman and company would often feel impelled to join in the choruses.

The night-watchman had sunk into log-like slumber, and the meteorologist and his merry men were making preparations to go abroad. The merry men included the ice-carrier, the magnetician, the two wardens of the dogs, the snow-shoveller and coal-carrier and the storeman. The rest subdivided themselves between the living Hut at 45°F. and the outer Hut below freezing-point, taking up their endless series of jobs.

The merry men began to make an organized raid on the kitchen. Around and above the stove hung oddments like wolf-skin mitts, finnesko, socks, stockings and helmets, which had passed from icy rigidity through sodden limpness to a state of parchment dryness. The problem was to recover one's own property and at the same time to avoid the cook scraping the porridge saucepan and the messman scrubbing the table.

The urbane storeman saved the situation by inquiring of the cook: "What will you have for lunch?" Then followed a heated colloquy, the former, like a Cingalese vendor, having previously made up his mind. The argument finally crystallized down to lambs' tongues and beetroot, through herrings and tomato sauce, fresh herrings, kippered herrings, sardines and corn beef.

The second question was a preliminary to more serious business: "What would you like for dinner?"

THE HOME OF THE BLIZZARD

Although much trouble might have been saved by reference to the regulation programme, which was composed to provide variety in diet and to eliminate any remote chance of scurvy, most cooks adopted an attitude of surly independence, counting it no mean thing to have wheedled from the storeman a few more ounces of "glaxo," another tin of peas or an extra ration of penguin meat. All this chaffering took place in the open market-place, so to speak, and there was no lack of frank criticism from bystanders, onlookers and distant eavesdroppers. In case the cook was worsted, the messman sturdily upheld his opinions, and in case the weight of public opinion was too much for the storeman, he slipped on his felt mitts, shouldered a Venesta box and made for the tunnel which led to the store.

He reaches an overhead vent admitting a cool torrent of snow, and with the inseparable box plunges ahead into darkness. An hour later his ruddy face reappears in the Hut, and a load of frosted tins is soon unceremoniously dumped on to the kitchen table. The cook in a swift survey notes the absence of penguin meat. "That'll take two hours to dig out!" is the storeman's rejoinder, and to make good his word, proceeds to pull off blouse and helmet. By careful inquiry in the outer Hut he finds an ice-axe, crowbar and hurricane lantern. The next move is to the outer veranda, where a few loose boards are soon removed, and the storeman, with a lithe twist, is out of sight.

We have pushed the tools down and, following the storeman, painfully squeezed into an Arcadia of starry mounds of snow and glistening plaques of ice, through which project a few boulders and several carcasses of mutton. The storeman rummages in the snow and discloses a pile of penguins, crusted hard together in a homogeneous lump. Dislodging a couple of penguins appears an easy proposition, but we are soon disillusioned. The storeman seizes the head of one bird, wrenches hard, and off it breaks as brittle as a stalactite. The same distracting thing happens to both legs, and the only remedy is to chip laboriously an icy channel around it.



Adelia Land

Hurley

A CORNER OF THE HUT—BAGE MENDING HIS SLEEPING-BAG. THE BUNKS IN TWO TIERS AROUND THE WALL ARE ALMOST HIDDEN BY THE CLOTHING HANGING FROM THE CEILING



A WINTER EVENING AT THE HUT. STANDING UP: MAWSON, MADIGAN, NINNIS AND CORRELL.
SITTING ROUND THE TABLE FROM LEFT TO RIGHT: STILLWELL, CLOSE, McLEAN, HUNTER,
HANNAH, HODGEMAN, MURPHY, LASERON, BICKERTON, MERTZ AND BAGE.

DOMESTIC LIFE

In a crouching or lying posture, within a confined space, this means the expenditure of much patience, not to mention the exhaustion of all invective. A crowbar decides the question. One part of the channel is undermined, into this the end of the crowbar is thrust and the penguin shoots up and hits the floor of the Hut.

The storeman, plastered with snow, reappears hot and triumphant before the cook, but this dignitary is awkwardly kneading the dough of wholemeal scones, and the messman is feeding the fire with seal-blubber to ensure a "quick" oven. Every one is too busy to notice the storeman, for, like the night-watchman, his day is over and he must find another job.

Jobs in the Hut were the elixir of life, and a day's cooking was no exception to the rule. It began at 7 A.M., and, with a brief intermission between lunch and afternoon tea, continued strenuously till 8.30 P.M. Cooks were broadly classified as "Crook Cooks" and "Unconventional Cooks" by the eating public. Such flattering titles as "Assistant Grand Past Master of the Crook Cooks' Association" or "Associate of the Society of Muddling Messmen" were not empty inanities; they were founded on solid fact—on actual achievement. If there were no constitutional affiliation, strong sympathy undoubtedly existed between the "Crook Cooks' Association" and "The Society of Muddling Messmen." Both contained members who had committed "championships."

"Championship" was a term evolved from the local dialect, applying to a slight mishap, careless accident or unintentional disaster in any department of Hut life. The fall of a dozen plates from the shelf to the floor, the fracture of a table-knife in frozen honey, the burning of the porridge or the explosion of a tin thawing in the oven brought down on the unfortunate cook a storm of derisive applause and shouts of "Championship! Championship!"

Thawing-out tinned foods by the heroic aid of a red-hot stove was a common practice. One day a tin of baked beans

THE HOME OF THE BLIZZARD

was shattered in the "port" oven, and fragments of dried beans were visible on the walls and door for weeks. Our military cook would often facetiously refer to "platoon-firing in the starboard oven."

One junior member of the "Crook Cooks' Association" had the hardihood to omit baking powder in a loaf of soda-bread, trusting that prolonged baking would repair the omission. The result was a "championship" of a very superior order. Being somewhat modest, he committed it through the trap-door to the mercy of the wind, and for a time it was lost in the straggling rubbish which tailed away to the north. Even the prowling dogs in their wolfish hunger could not overcome a certain prejudice. Of course some one found it, and the public hailed it with delight. A searching inquiry was made, but the perpetrator was never discovered. That loaf, however, like the proverbial bad penny, turned up for months. When the intricate system of snow-tunnels was being perfected, it was excavated. In the early summer, when the aeroplane was dug out of the Hangar, that loaf appeared once more, and almost the last thing we saw when leaving the Hut, nearly two years after, was this petrification on an icy pedestal near the Boat Harbour.

No one ever forgot the roly-poly pudding made without suet; synthetic rubber was its scientific name. And the muddling messman could never be surpassed who lost the cutter of the sausage machine and put salt-water ice in the melting-pots.

There appeared in the columns of *The Adelie Blizzard* an article by the meteorologist descriptive of an occasion when two members of the "Crook Cooks' Association" officiated in the kitchen :

DOMESTIC LIFE

TEREBUS AND ERROR IN ERUPTION

An 'Orrible Affair in One Act

BY A SURVIVOR

Dramatis Personæ

TEREBUS }
ERROR } Crook Cooks

Other Expedition Members

Scene : Kitchen, Winter Quarters. *Time* : 5.30 P.M.

ERROR. Now, Terebus, just bring me a nice clean pot, will you ?

TEREBUS [*from his bunk*]. Go on, do something yourself !

ERROR. Do something ? I've done everything that has been done this afternoon.

TEREBUS. Well, you ought to feel pretty fresh.

ERROR. And all the melting-pots are empty and I'm not going to fill them. Besides, it's not in the regulations.

VOICES. Who's going crook ? Error !

[TEREBUS *climbs from his bunk and exit for ice.*

ERROR *attempts to extricate a pot from the nails in the shelves. Loud alarums.*

VOICES. Champ-ion-ship !

[*Alarums without. Loud cries of "Door!" Enter TEREBUS with box of ice ; fills all the pots on the stove.*

ERROR. Good heavens, man, you've filled up the tea water with ice.

TEREBUS [*with hoarse laugh*]. Never mind, they won't want so much glaxo to cool it.

ERROR [*who has meanwhile been mixing bread*]. What shall we bake the bread in ? I believe it is considered that a square tin is more suitable for ordinary ovens, but, on the other hand, Nansen in his *Farthest North* used flat dishes.

TEREBUS. Use a tin. There'll be less surface exposed to the cold oven.

THE HOME OF THE BLIZZARD

ERROR. What's all this water on the floor? I thought my feet seemed cold. Some one must have upset a bucket.

TEREBUS. Oh, it's one of the taps turned on. Never mind, there's plenty more ice where that came from. Get your sea-boots.

[*Enter METEOROLOGICAL STAFF and others with snow-covered burberrys, mitts, etc., crowd kitchen and hang impedimenta round the stove. Great tumult.*]

TEREBUS. Here, out of the kitchen. This isn't the time to worry the cooks.

ERROR. Take those burberrys away, please, old man. They're dripping into the soup.

TEREBUS. Give it some flavour at least.

[*Great activity in the crater of ERROR while TEREBUS clears the kitchen. ERROR continues stirring soup and tapioca custard on the stove. Strong smell of burning.*]

VOICES [*in peculiarly joyful chorus*]. Something burning!

ERROR [*aside to TEREBUS*]. It's all right. It will taste all right. Say it's cloth on the stove.

TEREBUS. Somebody's burberrys burning against the stove!!

[*General rush to the stove.*]

TEREBUS. It's all right, I've taken them away.

[*Interval, during which much sotto voce discussion is heard in the kitchen.*]

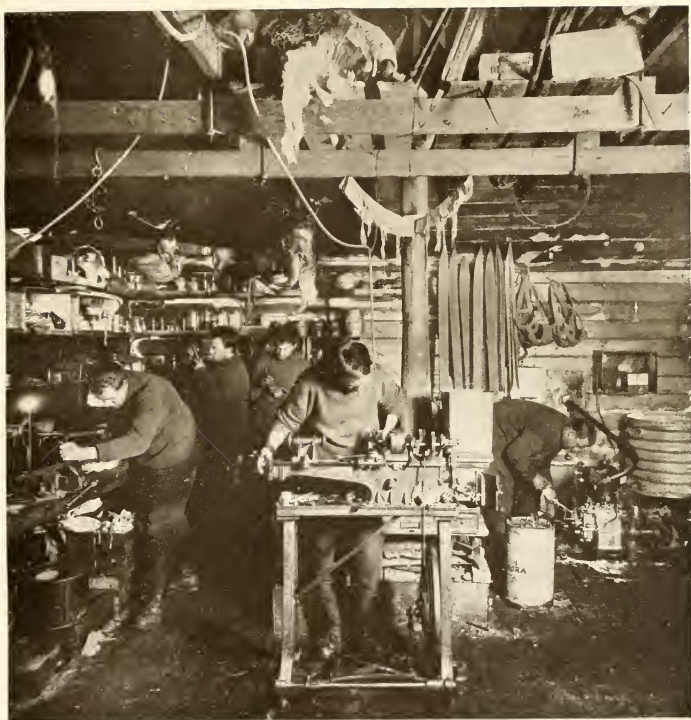
ERROR. We haven't put the spinach on to thaw and it's after six o'clock.

TEREBUS. Warm it up and put it on the table with the tin-openers.

ERROR. I'm afraid that's against the regulations. Put it in the oven and shut the door.

[*TEREBUS does so. Later, terrific explosion, followed by strong smell of spinach.*]

VOICES. What's the matter? Terebus in eruption!



Adlie Land

Hurley

A MORNING IN THE WORKSHOP. FROM LEFT TO RIGHT: HODGEMAN, HUNTER, LASERON, CORRELL AND HANNAM. THE WIRELESS ENGINE AND DYNAMO ON THE RIGHT



Artie Lind

WELDING A WELD IN THE WORKROOM. BICKERTON, CORRELL, HANNAH AND MAWSON

Hudley

DOMESTIC LIFE

TEREBUS [*wiping spinach off his face*]. Nothing wrong. Only a tin of spinach opened automatically.

ERROR. It's plastered all over the oven and on everything.

TEREBUS. Don't worry, it will be served up with the baked penguin.

[*Period of partial quiescence of TEREbus and ERROR, which is regarded as an evil omen.*]

ERROR [*in persuasive tone*]. Have you made the tea, old boy? It's nearly half-past six.

[*TEREBUS takes off the lid of the tea-boiler, peers inside, making a scoop with his hand.*]

ERROR. Here, don't do that. Mind your hands.

TEREBUS. It's all right, it's not hot.

ERROR. What shall we do, then? We'll never keep them quiet if we are late with the tea.

TEREBUS. Put the tea in now. It will be warmed up by the second course.

[*TEREBUS puts the infusers in the pot and stirs them round.*]

ERROR. Taste it.

[*BOTH taste with a dirty spoon.*]

TEREBUS. Tastes like your soup—'orrible!

ERROR. There's nothing wrong with the soup. You attend to the tea.

TEREBUS. I think we'll have coffee. Pass the coffee and I'll put that in and bring it to the boil. The coffee will kill the taste of the tea.

ERROR. Hope you make it stronger than that.

[*During quiescent stage while each is thinking of a retort, 6.30 P.M. arrives, and the soup is put on the table. Interval elapses during which the victims are expected to eat the soup.*]

VOICES [*in loud chant from the table*]. How did you do it, ERROR?

TEREBUS [*after a suitable period*]. Any one like any more soup?

THE HOME OF THE BLIZZARD

A VOICE. Couldn't risk it, Governor.

TEREBUS. Bowls up! Lick spoons!

[*Bowls are cleared away and baked penguin is put on the table.*]

ERROR. Cooks have got their penguin, gentlemen.

[*Suspicious glances exchanged at table. Later, monotonous chant goes up, preceded by a soft "One, two, three." "Didn't scrape the blubber off, Error."*]

[*Plates cleared away and scraped into dogs' bucket. ERROR takes tapioca custard from oven in two dishes.*]

ERROR [*aside to TEREBUS*]. Take some out of this one for us and don't forget to put that dish in front of the Doctor, because I spilled soda in the other.

[*TEREBUS takes two large helpings out and puts rest on table as directed.*]

TEREBUS. You need not remember the cooks, gentlemen.

A VOICE. Don't want to, if I can manage it.

ERROR [*aside to TEREBUS*]. Put on the Algerian sweets, and then we can have ours.

TEREBUS [*taking several handfuls*]. We'll put these aside for perks.

[*The sweets on the table, TEREBUS and ERROR retire to kitchen to have their dinner.*]

ERROR. Is this my pudding? It's only an ordinary share.

[*TEREBUS is too busy to reply, and further eruption is prevented by the temporary plugging of ERROR.*]

Cooking, under the inspiration of Mrs. Beeton, became a fine art :

On bones we leave no meat on,
For we study Mrs. Beeton.

So said the song. On birthdays and other auspicious occasions dishes appeared which would tempt a gourmet. Puff-pastry, steam-puddings, jellies and blancmanges, original potages and *consommés*, seal curried and spiced,

DOMESTIC LIFE

penguin delicately fried, vegetables re-flavoured, trimmed and adorned were received without comment as the culinary standard rose.

Birthdays were always greeted with special enthusiasm. Speeches were made, toasts were drunk, the supple boards of the table creaked with good things, cook and messman vied with each other in lavish hospitality, the Hut was ornate with flags, every man was spruce in his snowiest cardigan and neck-cloth, the gramophone sang of music-hall days, the wind roared its appreciation through the stove-pipe, and rollicking merriment was supreme. On such occasions the photographer and the biologist made a genial combination.

The dark-room was the nursery of the topical song. There, by lantern or candle-stump, wit Rabelaisian, Aristophanic or Antarctic was cradled into rhyme. From there, behind the scenes, the comedian in full dress could step before the footlights into salvos of savage applause. "A Pair of Unconventional Cooks are we, are we," and the famous refrain, "There he is, that's him," were long unrivalled in our musical annals.

Celebrations were carried on into the night, but no one forgot the cook and the messman. The table was cleared by many willing hands, some brought in ice and coal or swept the floor, others scraped plates or rinsed out mugs and bowls. Soon, everything had passed through the cauldron of water, soap and soda to the drying-towels and on to the shelves. The main crowd then repaired with pipes and cigars to "Hyde Park Corner," where the storeman, our *raconteur par excellence*, entertained the smokers' club. A mixed concert brought the evening to the grand finale—"Auld Lang Syne."

After events of this character, the higher shelves of the kitchen, in the interstices between thermographs, photographic plates ink bottles, and Russian stout, abounded with titbits of pie crust, blancmange, jelly, Vienna rusks, preserved figs, and other "perks." Such "perks," or

THE HOME OF THE BLIZZARD

perquisites, were the property of the presiding cook or night-watchman and rarely survived for more than a day.

The mania for celebration became so great that reference was frequently made to the almanac. During one featureless interval, the anniversary of the First Lighting of London by Gas was observed with extraordinary *éclat*.

The great medium of monetary exchange in the Hut was chocolate. A ration of thirty squares was distributed by the storeman every Saturday night, and for purposes of betting, games of chance, "Calcutta sweeps" on the monthly wind-velocity and general barter, chocolate held the premier place.

At the "sweeps," the meteorologist stood with a wooden hammer behind the table, and the gaming public swarmed on the other side. Numbers ranging from "low field" and forty-five to sixty-five and "high field" were sold by auction to the highest bidder. Excitement was intense while the cartographer in clerical glasses worked out the unknown number.

As a consequence of wild speculation, there were several cases of bankruptcy, which was redeemed in the ordinary way by a sale of the debtor's effects.

Two financiers, indifferent to the charms of chocolate, established a corner or "Bank" in the commodity. "The Bank," by barter and usurious methods, amassed a great heap of well-thumbed squares, and, when accused of rapacity, invented a scheme for the common good known as "Hun-toylette." This was a game of chance similar to roulette, and for a while it completely gulled the trusting public. In the reaction which followed, there was a rush on "The Bank," and the concern was wound up, but the promoters escaped with a large profit in candles and chocolate.

Throughout the winter months, work went on steadily even after dinner, and hours of leisure were easy to fill. Some wrote up their diaries, played games, or smoked and yarned; others read, developed photos, or imitated the weary cook and went to bed. The MacKellar Library,



IN THE CATACOMBS. NINNIS ON THE RIGHT

Harley



Adelie Land

BAGE AND HIS TIDE GAUGE WHICH WAS ERECTED
ON THE FROZEN BAY ICE

Hurley



Adelie Land

RAISING THE LOWER SECTION OF THE NORTHERN
WIRELESS MAST

Hurley

DOMESTIC LIFE

so called after the donor, was a boon to all, and the literature of polar exploration was keenly followed and discussed. Taste in literature varied, but among a throng of eighteen, the majority of whom were given to expressing their opinions in no uncertain terms—there were no rigid conventions in Adelie Land—every book had a value in accordance with a common standard.

There was not a dissenting voice to the charm of *Lady Betty across the Water*, and the reason for this was a special one. The sudden breath of a world of warmth and colour, richness and vivacity and astute, American freshness amid the somewhat grim attractions of an Antarctic winter was too much for every one. Lady Betty, in the realm of bright images, had a host of devoted admirers. Her influence spread beyond the Hut to the plateau itself. Three men went sledging, and to shelter themselves from the rude wind fashioned an ice-cavern, which, on account of its magical hues and rare lustre, could be none other than "Aladdin's Cave." Lady Betty found her hero in a fairy grotto of the same name.

Lorna Doone, on the other hand, was liked by many. Still there were those who thought that John Ridd was a fool, a slow, obtuse rustic, and so on, while Lorna was too divine and angelic for this life.

The War of the Carolinas took the Hut by storm, but it was a "nine days' wonder" and left no permanent impression on the thinking community. Mostly, the story was voted delightfully funny, but very foolish and farcical after all. A few exclusive critics predicted for it a future.

Then there was *The Trail of '98*. For power and blunt realism there was nothing like it, but the character of the hero was torn in the shreds of debate. There was general agreement on two points: that the portrayal of the desolate Alaskan wild had a touch of "home," and that the heroine was a "true sport."

All those who had ever hauled on the main braces, sung the topsail-halliard_chanty, learned the intricate Matty

THE HOME OF THE BLIZZARD

Walker, the bowline-and-a-bite and a crowd of kindred knots, had a warm spot for any yarn by Jacobs. Night after night, the storeman held the audience with the humorous escapades of *Ginger Dick*, *Sam* and *Peter Russet*.

And lastly, there was a more serious, if divided interest in *Virginibus Puerisque*, *Marcus Aurelius*, *The Unveiling of Lhasa*—but the list is rather interminable.

The whole world is asleep except the night-watchman, and he, having made the bread, washed a tubful of clothes, kept the fire going, observed and made notes on the aurora every fifteen minutes and the weather every half-hour, and, finally, having had a bath, indulges in buttered toast and a cup of coffee.

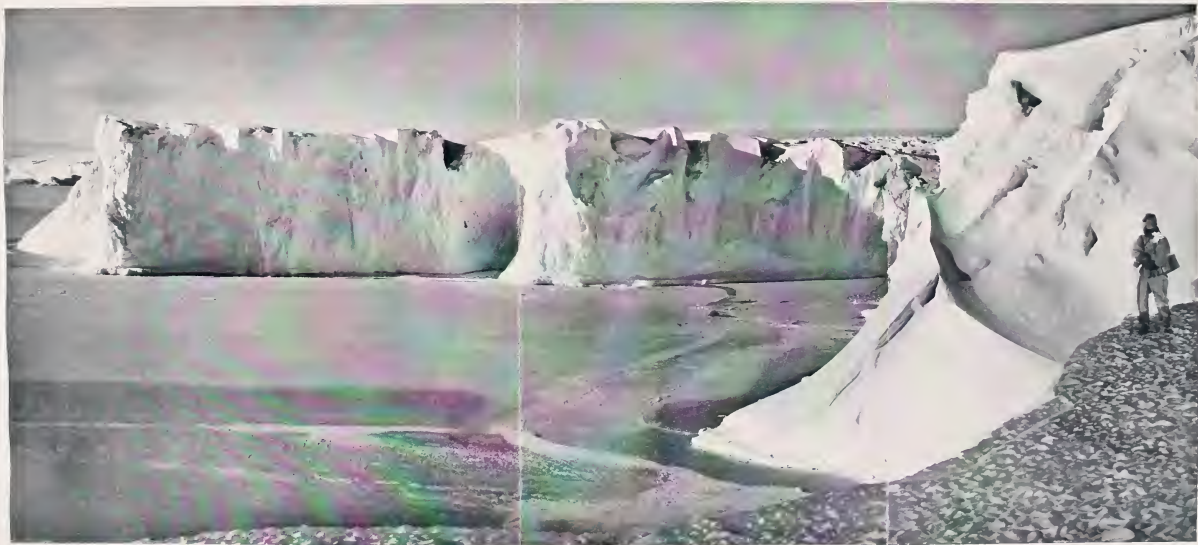
The Hut is dark, and a shaded burner hangs by a canvas chair in the kitchen. The wind is booming in gusts, the dogs howl occasionally in the veranda, but the night-watchman and his pipe are at peace with all men. He has discarded a heavy folio for a light romance, while the hours scud by, broken only by the observations. The romance is closed, and he steals to his bunk with a hurricane lamp and finds a bundle of letters. He knows them well, but he reads them—again!

Pearly light rises in the north-east through the lessening drift, and another day has come.



Adelie Land

Hurley



CHAPTER IX

MIDWINTER AND ITS WORK

WITH the advent of the fateful Ides of March, winter had practically set in, and work outside had a chequered career. When a few calm hours intervened between two blizzards a general rush was made to continue some long-standing job. Often all that could be done was to clear the field for action, that is, dig away large accumulations of snow. Then the furies would break loose again, and once more we would play the waiting game, meanwhile concerning ourselves with more sedentary occupations.

There was a familiar cry when, for some meteorological reason, the wind would relapse into fierce gusts and then suddenly stop, to be succeeded by intense stillness. "Dead calm, up with the wireless masts!" Every one hastily dashed for his burberrys, and soon a crowd of muffled figures would emerge through the veranda exit, dragging ropes, blocks, picks, and shovels. There was no time to be lost.

So the erection of the wireless masts began in earnest on April 4, continued feverishly till the end of the month, suffered a long period of partial cessation during May and June, was revived in July and August, and, by September 1, two masts, each consisting of a lower-mast and top-mast, had been raised and stayed, while between them stretched the aerial. For four weeks messages were sent out, and many of them were caught by Macquarie Island. Nothing was heard in Adelie Land, although, between certain hours, regular watches were kept at the receiver. The aerial was

THE HOME OF THE BLIZZARD

about sixty-five feet from the ground, and it was resolved to increase its height by erecting the top-gallant masts; but before anything considerable could be done, a terrific gust of wind on October 13 broke three wire-stays, and down came the mast, broken and splintered by the fall. That is a brief résumé of the fortunes of the "wireless" during the first year.

During February and March there were various other operations of more immediate importance which prevented concentration of our workers on the erection of the masts. There were many odd jobs to finish about the Hut, the Magnetograph House and Absolute Hut were "under way," the air-tractor sledge had to be efficiently housed, and all these and many other things could be done in weather during which it was out of question to hoist a mast into position. At first we were fastidious and waited for a calm, but later, as we grew more impatient, a top-mast was actually hauled up in a wind of thirty miles per hour, with gusts of higher velocity. Such work would sometimes be interrupted by a more furious outbreak, when all ropes would be secured and everything made as ship-shape as possible.

On March 15 the following note was made: "The wind was on the cool side just after breakfast. A few loads of wireless equipment were sledged up to the rocks at the back of the Hut, and by the time several masts were carried to the same place we began to warm to the work. One of Hannam's coils of frozen rope (one hundred and twenty fathoms) had become kinked and tangled, so we dragged it up the ice-slope, straightened it out and coiled it up again. Several 'dead men' to hold the stays were sunk into ice-holes, and, during the afternoon, one mast was dragged into position by a willing crowd. Rocks were sledged to and packed around the 'dead men' in the holes to make them compact. Towards sundown snow clouds filled the northern sky and a blizzard sprang up which is now doing sixty miles per hour. We philosophically expect another week cooped up in the Hut."

MIDWINTER AND ITS WORK

It took a long time to establish the twenty good anchorages necessary for the masts. Within a radius of eighty yards from the centre, ice-holes were dug, cairns of heavy boulders were built and rocky prominences dynamited off to secure an efficient holding for the stout "strops" of rope. April 24 was a typical day: "We spent the morning fixing up 'strops' for the wireless masts. The wind was blowing strongly in fifty- to sixty-mile gusts with drift, but most of the fellows 'stuck at it' all day. It was cold work on the hands and feet. Handling picks and shovels predisposes to frost-bite. Several charges of dynamite were fired in one hole wherein a mast will be stepped."

Each mast, of oregon timber, was in four sections. The lowest section was ten inches square and tapered upwards to the small royal mast at a prospective height of one hundred and twenty feet. At an early stage it was realized that we could not expect to erect more than three sections. Round the steel caps at each doubling a good deal of fitting had to be done, and Bickerton, in such occupation, spent many hours aloft throughout the year. Fumbling with bulky mitts, handling hammers and spanners, and manipulating nuts and bolts with bare hands, while suspended in a boat-swain's chair in the wind, the man up the mast had a difficult and miserable task. Bickerton was the hero of all such endeavours. Hannam directed the other workers who steadied the stays, cleared or made fast the ropes, pulled and stood by the hauling tackle and so forth.

One day the man on the top-mast dislodged a heavy engineering hammer which he thought secure. No warning was given, as he did not notice that it had fallen. It whizzed down and buried itself in the snow, just grazing the heads of Close and Hodgeman.

The ropes securing the aerial and running through various blocks were in constant danger of chafing during the frequent hurricanes, from their proximity to the mast and stays, or from friction on the sharp edges of the blocks. Unknown to us, this had happened to a strong, new manilla rope by

THE HOME OF THE BLIZZARD

which Murphy was being hauled to the top of the lower-mast. It gave way, and, but for another rope close by, which he seized to break his fall, an accident might have ensued.

Frost-bites were common. There were so many occasions when one had to stand for a long time gripping a rope, pulling or maintaining a steady strain, that fingers would promptly become numb and feet unbearably cold. The usual restorative was to stamp about and beat the chest with the hands—an old sailor's trick. Attempting to climb to a block on the top-gallant mast one day, McLean had all his fingers frost-bitten at the same time.

In May the weather was atrocious, and in June building the Astronomical Hut and digging ice-shafts on the glacier absorbed a good many hands. In July, despite the enthusiasm and preparation for sledging, much was done. On August 10 the long looked-for top-mast of the southern mast became a reality :

“ We were early astir—about 7 A.M.—while the pink coloration of dawn was stealing over the peaceful Barrier. For once, after months, it was perfectly still. We hurried about making preparations—hauled Bickerton up to the cross-trees and awaited the moment when we should raise the top-mast. We pulled it up half-way and Bickerton affixed a pin in its centre, above which two stays were to be attached. Suddenly, down came the wind in terrific gusts and, after securing the stays, the job had to be given up. . . . We were just about to have lunch when the wind ceased as suddenly as it had begun. We all sallied out once more, and, this time, completed the job, though for a while the top-mast was in imminent peril of being blown away by a sharp northerly gust.”

Next day the aerial was hoisted in a wind of sixty miles per hour, but the strain was so severe on the block, up-wind, that it carried away. Fortunately the insulators of the aerial were entangled by the stays in their fall to ground, otherwise some one may have been hurt, as there were a dozen men almost directly below.



Adelie Land

BAGE AT THE DOOR OF HIS ASTRONOMICAL
TRANSIT HOUSE

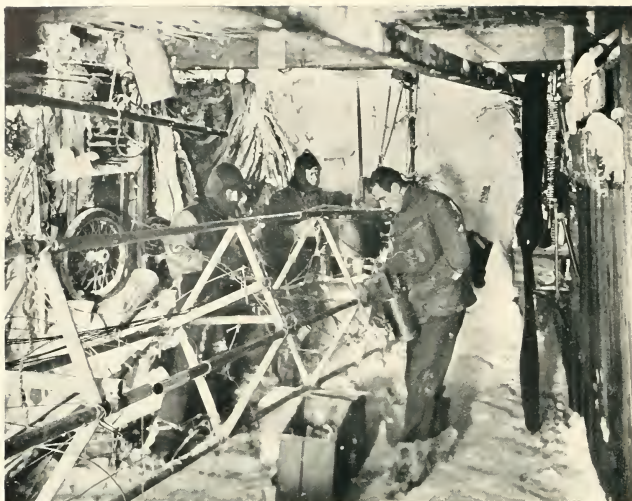
Hurley



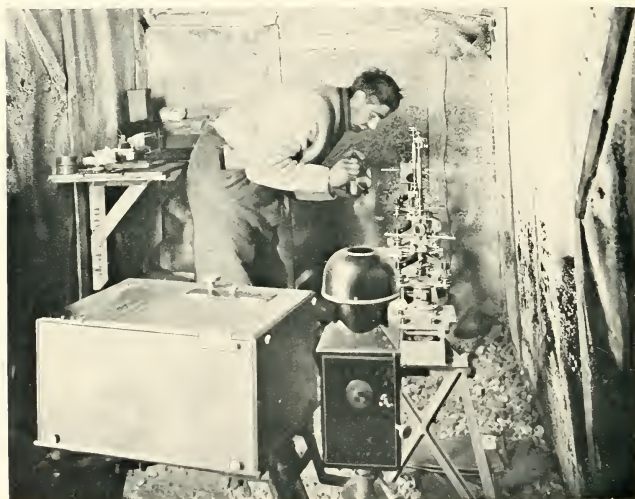
Adelie Land

WEBB AND HIS MAGNETOGRAPH HOUSE

Hurley



Adelie Land AT WORK ON THE AIR-TRACTOR SLEDGE IN THE HANGAR; *Hurley*
BAGE, NIXIS AND BICKERTON



Adelie Land WEBB ADJUSTING THE INSTRUMENTS IN THE
MAGNETOGRAPH HOUSE *Hurley*

MIDWINTER AND ITS WORK

Six days after this accident, August 17, the top-mast halliard of the down-wind mast frayed through, and as a stronger block was to be affixed for the aerial, some one had to climb up to wire it in position. Bickerton improvised a pair of climbing irons, and, after some preliminary practice, ascended in fine style.

Finally, by September 30, the aerial was at such a height as to give hope that long-distance messages might be despatched. There was a certain amount of suppressed excitement on the evening of that day when the engine started and gradually got up speed in the dynamo. The sharp note of the spark rose in accompanying crescendo and, when it had reached its highest pitch, Hannam struck off a message to the world at large. No response came after several nights of signalling, and, since sledging had usurped every other interest, the novelty soon wore off.

“Atmospherics”—discharges of atmospheric electricity—and discharges from the drift-snow were heard in the wireless receiver.

While messages were being sent, induction effects were noted in metallic objects around the Hut. A cook at the stove was the first to discover this phenomenon, and then every one conceived a mania for “drawing” sparks. A rather stimulating experience—the more so as it usually happened unexpectedly and accidentally—was to brush one’s head against one of the numerous coils of flexible metal gas-piping festooned about the place. Sparks immediately jumped the interval with startling effect.

October 13, the day when the mast blew down, was known in wireless circles as Black Sunday. All had worked keenly to make the “wireless” a success, and the final event was considered to be a public misfortune. However, the honours were to be retrieved during the following year.

It fell to the lot of most of the Staff that they developed an interest in terrestrial magnetism. For one thing every man had carried boulders to the great stockade surrounding

THE HOME OF THE BLIZZARD

the Magnetograph House. Then, too, recorders were regularly needed to assist the magnetician in the Absolute Hut. There, if the temperature were not too low and the observations not too lengthy, the recorder stepped out into the blizzard with the conviction that he had learned something of value, and, when he sat down to dinner that night, it was with a genial sense of his own altruism. In his diary he would write it all up for his own edification.

It would be on this wise: The Earth's magnetic force, which is the active agent in maintaining the compass-needle in the magnetic meridian* at any particular spot, acts, not as is popularly supposed, in a horizontal plane, but at a certain angle of inclination with the Earth's surface. The nearer the magnetic poles the more nearly vertical does the freely suspended needle become. At the South Magnetic Pole it assumes a vertical position with the south end downwards; at the North Magnetic Pole it stands on its other end. At intermediate positions near the Equator the whole force is exerted, swinging the needle in the horizontal plane, and in such regions ordinary ships' compasses pivoted to move freely only in a horizontal plane give the greatest satisfaction. On approaching the magnetic poles, compasses become sluggish, for the horizontal deflecting force falls off rapidly. The force, acting in a vertical direction, tending to make the needle dip, correspondingly increases, but is of no value for navigation purposes. However, in the scientific discussion of terrestrial magnetism, both the horizontal and vertical components as well as the absolute value of the total force are important, and the determination of these "elements" is the work of the magnetician. Affecting the average values of the "magnetic elements" at any one spot on the Earth's surface are regular diurnal oscillations, apparent only by the application of very delicate methods of observation: also there are sudden large irregular movements referred to as magnetic storms; the latter are

* The magnetic meridian is the straight line joining the North and South Magnetic Poles and passing through the spot in question.

MIDWINTER AND ITS WORK

always specially noticeable when unusually bright auroral phenomena are in progress.

The observations made in the "Absolute Hut," carried out at frequent intervals and on each occasion occupying two men for several hours together, are necessary to obtain standard values as a check upon the graphic record of the self-recording instruments which run day and night in the "Magnetograph House."

But this is another story. Three hours, sitting writing figures in a temperature of -15° F., is no joke. The magnetician is not so badly off, because he is moving about, though he often has to stop and warm his fingers, handling the cold metal.

The Magnetograph House had by far the most formidable name. The Hut, though it symbolized our all in all, sounded very insignificant unless it were repeated with just the right intonation. The Absolute Hut had a superadded dignity. The Hangar, in passing, scarcely seemed to have a right to the capital H. The Transit House, on the other hand, was the only dangerous rival to the first mentioned. But what's in a name?

If the Magnetograph House had been advertised, it would have been described as "two minutes from the Hut." This can be easily understood, for the magnetician after leaving home is speedily blown over a few hillocks and sastrugi, and, coming to an ice-flat about one hundred and fifty yards wide, swiftly slides across it, alighting at the snow-packed door of his house. The outside porch is just roomy enough for a man to slip off burberrys and crampons. The latter are full of steel spikes, and, being capable of upsetting magnetic equilibrium, are left outside. Walking in soft finnesko, the magnetician opens an inner door, to be at once accosted by darkness, made more intense after the white glare of the snow. His eyes grow accustomed to the blackness, and he gropes his way to a large box almost concealing the feeble glimmer of a lamp. The lamp is the source of light, projected on to small mirrors attached to the magnetic

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needles of three variometers. A ray of light is reflected from the mirrors for several feet on to a slit, past which revolves sensitized photographic paper folded on a drum moving by clockwork. The slightest movements of the suspended needles are greatly magnified, and, when the paper is removed and developed in a dark-room, a series of intricate curves denoting declination, horizontal intensity and vertical force, are exquisitely traced. Every day the magnetician attends to the lamp and changes papers; also at prearranged times he tests his "scale values" or takes a "quick run."

To obtain results as free as possible from the local attraction of the rocks in the neighbourhood, Webb resolved to take several sets of observations on the ice-sheet. In order to make the determinations it was necessary to excavate a cave in the glacier. This was done about three-quarters of a mile south of the Hut in working shifts of two men. A fine cavern was hewn out, and there full sets of magnetic observations were taken under ideal conditions.

On sledging journeys the "dip" and declination were both ascertained at many stations, around and up to within less than half a degree of the South Magnetic Pole.

While the wind rushed by at a maddening pace and stars flashed like jewels in a black sky, a glow of pale yellow light overspread the north-east horizon—the aurora. A rim of dark, stratus cloud was often visible below the light which brightened and diffused till it curved as a low arc across the sky. It was eerie to watch the contour of the arc break, die away into a delicate pallor and reillumine in a travelling riband. Soon a long ray, as from a search-light, flashed above one end, and then a row of vertical streamers ran out from the arc, probing upwards into the outer darkness. The streamers waxed and waned, died away to be replaced and then faded into the starlight. The arc lost its radiance, divided in patchy fragments, and all was dark once more.

This would be repeated again in a few hours and irregu-

THE ALPINE-GLOW

Cape Denison. Autochrome photo by Merz.



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larly throughout the night, but with scenic changes behind the great sombre pall of the sky. North-west, north-east, and south-east it would elusively appear in nebulous blotches, flitting about to end finally in long bright strands in the zenith, crossing the path of the "milky way."

By the observer, who wrote down his exact observations in the meteorological log, this was called a "quiet night."

At times the light was nimble, flinging itself about in rich waves, warming to dazzling yellow-green and rose. These were the nights when "curtains" hung festooned in the heavens, alive, rippling, dancing to the lilt of lightning music. Up from the horizon they would mount, forming a vortex overhead, soundless within the silence of the ether.

A "brilliant display," we would say, and the observer would be kept busy following the track of the evanescent rays.

Powerless, one was in the spell of an all-enfolding wonder. The vast, solitary snow-land, cold-white under the sparkling star-gems; lustrous in the radiance of the southern lights; furrowed beneath the icy sweep of the wind. We had come to probe its mystery, we had hoped to reduce it to terms of science, but there was always the "indefinable" which held aloof, yet riveted our souls.

The aurora was always with us, and almost without exception could be seen on a dark, driftless night. The nature of the aurora polaris has not yet been finally demonstrated, though it is generally agreed to be a discharge of electricity occurring in the upper, more rarefied atmosphere. The luminous phenomena are very similar to those seen when a current of electricity is passed through a vacuum tube.

One receives a distinct impression of nearness, watching the shimmering edges of the "curtains" in the zenith, but all measurements indicate that they never descend nearer than a few miles above the land-surface.

Careful records were taken to establish a relation between

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magnetic storms and auroræ, and a good deal of evidence was amassed to support the fact that auroral exhibitions correspond with periods of great magnetic disturbance. The displays in Adelie Land were found to be more active than those which occur in higher latitudes in the Ross Sea.

An occupation which helped to introduce variety in our life was the digging of ice-shafts. For the purpose of making observations upon its structure and temperature various excavations were made in the sea-ice, in the ice of the glacier, and in that of the freshwater lakes. The work was always popular. Even a whole day's labour with a pick and shovel at the bottom of an ice-hole never seemed laborious. It was all so novel.

A calm morning in June, the sky is clear and the north ablaze with the colours of sunrise—or is it sunset? The air is delicious, and a cool waft comes down the glacier. A deep ultramarine, shading up into a soft purple hue, blends in a colour-scheme with the lilac plateau. Two men crunch along in spiked boots over snow mounds and polished sastrugi to the harbour-ice. The sea to the north is glazed with freezing spicules, and over it sweep the petrels—our only living companions of the winter. It is all an inspiration; while hewing out chunks of ice and shovelling them away is the acute pleasure of movement, exercise.

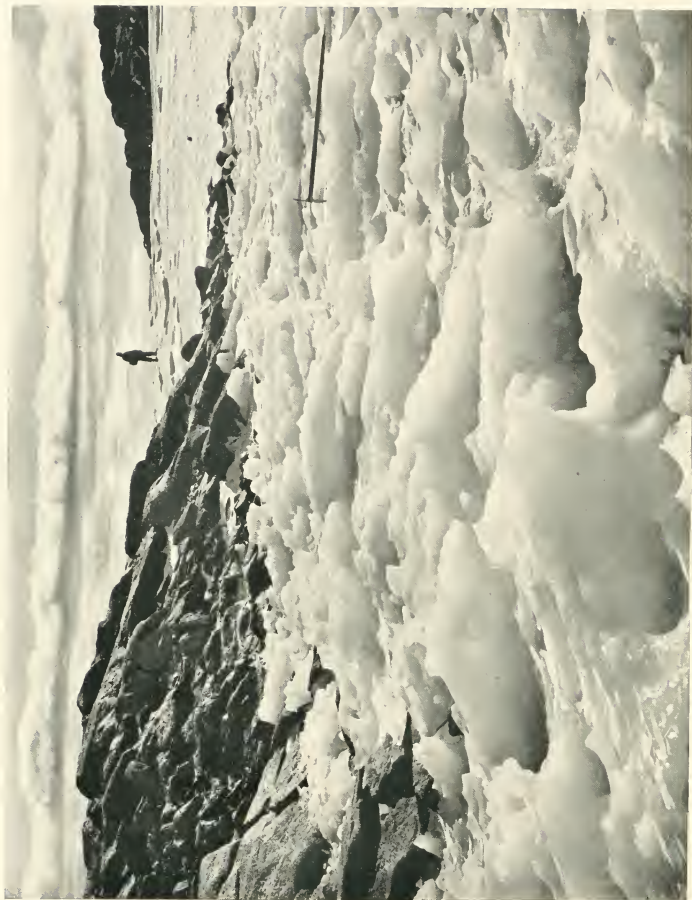
The men measure out an area six feet by three feet, and take a preliminary temperature of the surface-ice by inserting a thermometer in a drilled hole. Then the ice begins to fly, and it is not long before they are down one foot. Nevertheless it would surprise those acquainted only with fresh water ice to find how tough, sticky and intractable is sea-ice. It is always well to work on a definite plan, channelling in various directions, and then removing the intervening lumps by a few rough sweeps of the pick. At a depth of one foot, another temperature is taken, and some large samples of the ice laid by for the examination of their crystalline structure. This is repeated at two feet, and so on, until



Adelie Land

A CALM MOON IN WINTER, CAPE DENISON

Barley



Cape Denison

THE RIDGED SURFACE OF A LAKE FROZEN DURING A BLIZZARD

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the whole thickness is pierced to the sea-water beneath. At three feet brine may begin to trickle into the hole, and this increases in amount until the worker is in a puddle. The leakage takes place, if not along cracks, through capillary channels, which are everywhere present in sea-ice.

It is interesting to note the temperature gradually rise during the descent. At the surface the ice is chilled to the air-temperature, say -10° F., and it rises in a steep gradient to approximately 28° F.; close to the freezing-point of sea water. The sea-ice in the boat-harbour varied in thickness during the winter between five and seven feet.

In contrast with sea-ice, the ice of a glacier is a marvel of prismatic colour and glassy brilliance. This is more noticeable near the surface when the sun is shining. Deep down in a shaft, or in an ice-cavern, the sapphire reflection gives to the human face quite a ghastly pallor.

During the high winds it was always easy to dispose of the fragments of ice in the earlier stages of sinking a shaft. To be rid of them, all that was necessary was to throw a shovelful vertically upwards towards the lee-side of the hole; the wind then did the rest. Away the chips would scatter, tinkling over the surface of the glacier. Of course, when two men were at work, each took it in turns to go below, and the one above, to keep warm, would impatiently pace up and down. Nevertheless, so cold would he become at times that a heated colloquy would arise between them on the subject of working overtime. When the shaft had attained depth, both were kept busy. The man at the pit's mouth lowered a bucket on a rope to receive the ice and, in hauling it up, handicapped with clumsy mitts, he had to be careful not to drop it on his companion's head.

The structural composition of ice is a study in itself. To the cursory glance a piece of glacier-ice appears homogeneous, but when dissected in detail it is found to be formed of many crystalline, interlocking grains, ranging in size from a fraction of an inch to several inches in diameter.

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A grain-size of a half to one inch is perhaps commonest in Antarctic glacier-ice.

The history of Antarctic glacier-ice commences with the showers of snow that fall upon the plateau. The snow particles may be blown for hundreds of miles before they finally come to rest and consolidate. The consolidated snow is called *névé*, the grains of which are one-twenty-fifth to one-hundredth of an inch in diameter, and, *en masse*, present a dazzling white appearance on account of the air spaces which occupy one-third to one-half of the whole. In time, under the influence of a heavy load of accumulated layers of *névé*, the grains run together and the air spaces are eliminated. The final result is clear, transparent ice, of a more or less sapphire-blue colour when seen in large blocks. It contains only occasional air-bubbles, and the size of the grains is much increased.

Lake-ice, freezing from the surface downwards, is built up of long parallel prisms, like the cells of a honey-comb on a large scale. In a lakelet near the Hut this was beautifully demonstrated. In some places cracks and fissures filled with snow-dust traversed the body of the ice, and in other places long strings of beaded air-bubbles had become entangled in the process of freezing. To lie down on the clear surface and gaze "through the looking-glass" to the rocky bottom, twenty feet below, was a glimpse into "Wonderland."

In the case of sea-ice, the simple prismatic structure is complicated owing to the presence of saline matter dissolved in the sea water. The saline tracts between the prisms produce a milky or opalescent appearance. The prisms are of fresh water ice, for in freezing the brine is rejected and forced to occupy the interstices of the prisms. Water of good drinking quality can be obtained by allowing sea water ice to thaw partially. The brine, of lower freezing-point, flows away, leaving only fresh water ice behind. In this way blocks of sea-ice exposed to the sun's rays are relieved of their salty constituents, and crumble into pellucid gravel when disturbed.

MIDWINTER AND ITS WORK

A popular subject commanding general interest, apart from the devoted attention of specialists, was zoological collecting. Seals and birds were made the prey of every one, and dredging through the sea-ice in winter and spring was always a possible diversion.

It was a splendid sight to watch the birds sailing in the high winds of Adelie Land. In winds of fifty to seventy miles per hour, when with good crampons one had to stagger warily along the ice-foot, the snow petrels and Antarctic petrels were in their element. Wheeling, swinging, sinking, planing and soaring, they were radiant with life—the wild spirits of the tempest. Even in moderate drift, when through swirling snow the vistas of sea whitened under the flail of the wind, one suddenly caught the silver flash of wings and a snow petrel glided past.

But most memorable of all were certain winter mornings of unexpected calm, when ruddy clouds tessellated the northern sky and were mirrored in the freezing sea. Then the petrels would be *en fête*, flying over from the east following the line of the Barrier, winding round the icy coves, darting across the jutting points and ever onward in their long migration. In the summer they flew for weeks from the west—a never-ending string of snow, silver-grey and Antarctic petrels, and Cape pigeons. The silver-grey petrels and Cape pigeons were only abroad during that season and were accompanied by skua gulls, giant petrels, Wilson petrels, and penguins. The penguins remained in Adelie Land for the longest period—almost six months, the skua gulls and giant petrels for five months, and the rest for a shorter period—the tolerable season of midsummer.

Birds that haunt the wide oceans all make use of the soaring principle in flight, some much more than others. The beautiful sliding sweep of the albatross is the most familiar example. With wings outspread, it is a miniature aeroplane requiring no engines, for the wind itself supplies the power. A slight movement of the tail-feathers and wing-tips controls its balance with nice precision. Birds

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employing this method of flight find their home in the zone of continuous steady winds which blow across the broad wastes of the southern seas.

Many petrels on the wing were shot during the winter. Laseron, who prepared the skins of our Adelic Land collection, determined, in the case of a number of specimens, the ratio of weight to horizontal area exposed to the wind. This subject is one which has lately exercised the curiosity of aviators. The ratios are those evolved by nature, and, as such, should be wellnigh perfect. Below is appended a table of the results obtained.

WEIGHT OF CERTAIN ANTARCTIC BIRDS IN RELATION TO WING AREAS (Stated in pounds per square foot of wing surface)

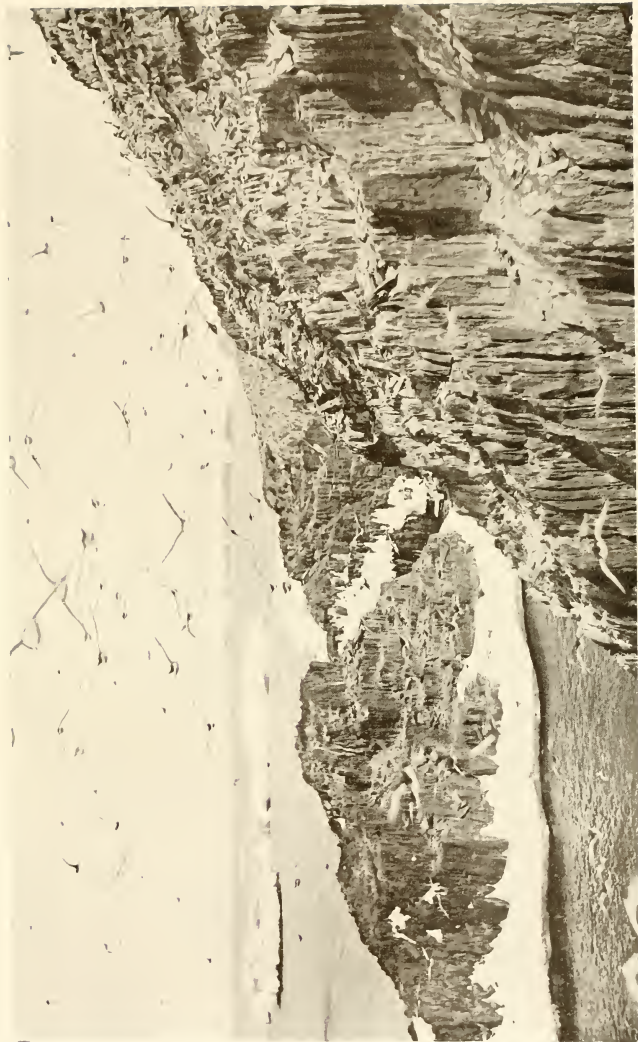
Each is the mean of several determinations by Laseron

Giant petrel	3·5
Albatross	2·4
Antarctic petrel	2·1
Skua gull	1·6
Snow petrel	1·1
Wilson petrel	0·6

Values from a book of reference quoted for comparison

Bat	0·1
Sparrow	0·4
Wild goose	1·7

During the winter, for a long period, no seals ventured ashore, though a few were seen swimming in the bay. The force of the wind was so formidable that even a heavy seal, exposed in the open, broadside-on, would be literally blown into the water. This fact was actually observed out on the harbour-ice. A Weddell seal made twelve attempts to land on a low projecting shelf—an easy feat under ordinary circumstances. The wind was in the region of eighty-five miles per hour, and every time the clumsy, ponderous creature secured its first hold, back it would be tumbled. Once it managed to raise itself on to the flat surface, and, after a breathing spell, commenced to shuffle towards the shelter of some pinnacles on one side of the harbour. Immediately its broad flank was turned to the wind it was rolled



Adelle Loud

A LIVELY SCENE IN THE VICINITY OF AN ANTARCTIC PETREL ROOKERY, CAPE HUNTER

Hudley



Harley
A RASCALLY SEA-LEOPARD CASTING A WICKED EYE OVER THE
BROKEN FLOE AT LAND'S END, MAIN BASE



Mertz
A WEDDELL SEAL SWIMMING BELOW THE ICE-FOOT

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over, hung for a few seconds on the brink, and then splashed into the sea. On the other hand, during the spring, a few more ambitious seals won their way ashore in high winds; but they did not remain long in the piercing cold, moving uneasily from place to place in search of protecting hummocks and finally taking to the water in despair. Often a few hours of calm weather was the signal for half a dozen animals to land. The wind sooner or later sprang up and drove them back to their warmer element.

Under the generic name, seal, are included the true or hair seals and the sea-bears or fur seals. Of these the fur seals are sub-polar in distribution, inhabiting the cold temperate waters of both hemispheres, but never living amongst the polar ice. The southern coast of Australia and the sub-antarctic islands were their favourite haunts, but the ruthless slaughter of the early days practically exterminated them. From Macquarie Island, for example, several hundred thousand skins were taken in a few years, and of late not a single specimen has been seen.

Closely related to the fur seals are the much larger animals popularly known as sea-lions. These still exist in great numbers in south temperate waters. Both are distinguished from the hair seals by one obvious characteristic: their method of propulsion on land is by a "lolloping" motion, in which the front and hind flippers are used alternately. The hair seals move by a caterpillar-like shuffle, making little or no use of their flippers; and so, the terminal parts of their flippers are not bent outwards as they are in the fur seals and sea-lions.

Of the hair seals there are five varieties to be recognized in the far South. The Weddell seals, with their mottled-grey coats, are the commonest. They haunt the coasts of Antarctica and are seldom found at any distance from them. Large specimens of this species reach nine and a half feet in length.

The crab-eater seal, a smaller animal, lives mostly on the pack-ice. Lying on a piece of floe in the sunshine it

THE HOME OF THE BLIZZARD

has a glistening, silver-grey skin—another distinguishing mark being its small, handsome head and short, thin neck. Small crustaceans form its principal food.

The Ross seal, another inhabitant of the pack-ice, is short and bulky, varying from a pale yellowish-green on the under side to a dark greenish-brown on the back. Its neck is ample and bloated, and when distended in excitement reminds one of a pouter-pigeon. This rare seal appears to subsist mainly on squid and jelly-fish.

The sea-leopard, the only predacious member of the seal family, has an elongated agile body and a large head with massive jaws. In general it has a mottled skin, darker towards the back. It lives on fish, penguins and seals. Early in April, Hurley and McLean were the first to obtain proof that the sea-leopard preyed on other seals. Among the broken floe-ice close beneath the ice-cliffs to the west of Winter Quarters, the wind was driving the dead body of a Weddell seal which swept past them, a few yards distant, to the open water. Then it was that a sea-leopard was observed tearing off and swallowing great pieces of flesh and blubber from the carcase.

The last variety of hair seal, the sea elephant, varies considerably from the preceding. Reference has already been made to the species earlier in the narrative. The habitat of these monstrous animals ranges over the cold, south-temperate seas; sea elephants are but occasional visitors to the ice-bound regions. Although they have been exterminated in many other places, one of their most populous resorts at the present day is Macquarie Island.

In the case of all the hair seals a layer of blubber several inches in thickness invests the body beneath the skin and acts as a conserver of warmth. They are largely of value for the oil produced by rendering down the blubber. The pelts are used for leather.

The operation of skinning seals for specimens, in low temperatures and in the inevitable wind, was never unduly protracted. We were satisfied merely to strip off the skin,

MIDWINTER AND ITS WORK

leaving much blubber still adhering to it. In this rough condition it was taken into the work-room of the Hut to be cleaned. The blubber froze, and then had the consistency of hard soap and was readily severed from the pelt. It was found that there exuded amongst the frozen blubber a thin oil which remained liquid when collected and exposed to low temperatures. This oil was used to lubricate the anemometer and other instruments exposed outside.

The main part of the biological work lay in the marine collections. Hunter with the small hand-dredge brought up abundant samples of life from depths ranging to fifty fathoms. In water shallower than ten fathoms the variety of specimens was not great, including seaweeds up to eighteen or more feet in length, a couple of forms of starfish, various small mollusca, two or three varieties of fish, several sea-spiders, hydroids and lace corals, and, in great profusion, worms and small crustaceans. In deeper waters the life became much richer, so that examples of almost every known class of marine animals were represented.

Early in June the sea bottom in depths less than ten fathoms had become so coated with ice that dredging in shallow water was suspended.

Floating or swimming freely were examples of pteropods, worms, crustaceans, ostracods, and jelly-fish. These were easily taken in the hand-net.

In those regions where ice and water are intermingled, the temperature of the water varies very slightly in summer and winter, remaining approximately at freezing-point. In summer the tendency to heating is neutralized by a solution of some of the ice, and in winter the cold is absorbed in the production of a surface layer of ice. This constancy of the sea's temperature is favourable to organic life. On land there is a wide range in temperature, and only the meagre mosses and lichens, and the forms of insect life which live among them can exist, because they have developed the capacity of suspending animation during the winter. The

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fresh-water lakelets were found to be inhabited by low forms of life, mainly microscopic. Among these were diatoms, algæ, protozoa, rotifera, and bacteria.

The last-named were investigated by McLean and were found to be manifold in distribution. Besides those from the intestines of animals and birds, cultures were successfully made from the following natural sources: lichen soil, moss soil, morainic mud, guano, ice and snow. The results may open some new problems in bacteriology.

Of recent years much attention has been given to the study of parasites—parasitology. Parasites may be external, on the skin; internal, in the alimentary canal; or resident, in the corpuscles of the blood. In tropical countries, where there is great promiscuity of life, one is led to expect their almost universal presence. But in polar regions, where infection and intimate co-habitation for long periods are not the rule, while the climate is not favourable to organic existence, one would be surprised to find them in any great number. The fact remains that internal parasites were found in the intestine of every animal and fish examined, and in all the birds except the Wilson petrel. External parasites were present on every species of bird and seal, though individuals were often free of them. This was so in the case of the Adelic penguins. It is a demonstration of the protective warmth of the feathers that Emperor penguins may harbour insect parasites in great numbers. It is only less wonderful than the fact that they are able to rear their young during the Antarctic winter. A large number of blood-slides were prepared and stained for examination for blood-parasites.

Searching for "fleas" amongst the feathers of birds and the hair of seals, or examining the viscera for "worms" is neither of them a pleasant occupation. To be really successful, the enthusiasm of the specialist is necessary. Hunter allowed no opportunities to pass and secured a fine collection of parasites.

Amongst other work, McLean carried out monthly



A CRAB-EATER SEAL; COMMON AMONGST THE PACK-ICE

Harley



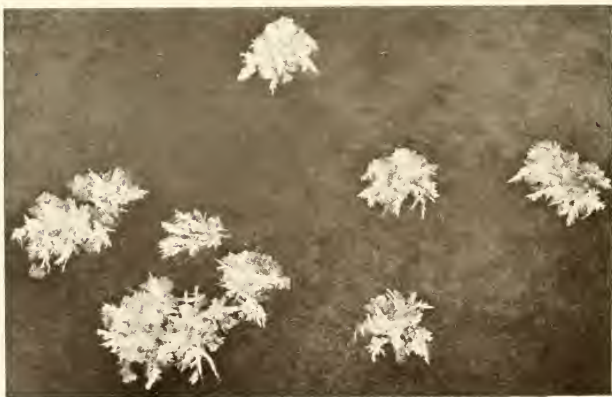
THE RARE ROSS SEAL

Harley



ONE OF McLEAN'S CULTURES; BACTERIA AND MOULDS;
ILLUSTRATING MICRO-ORGANISMS IN THE HUT

Harley



ICE FLOWERS ON THE NEWLY FORMED SEA-ICE

Harley

MIDWINTER AND ITS WORK

observations on six men, determining the colour-index and hæmoglobin value of their blood over a period of ten months. The results showed a distinct and upward rise above the normal.

Among societies privileged to see the daily paper and to whom diversity and change are as the breath of life, the weather is apt to be tabooed as a subject of conversation. But even the most versatile may suddenly find themselves stripped of ideas, ignominiously reduced to the obvious topic. To us, instead of being a mere prelude to more serious matters, or the last resort of a feeble intellect, it was the all-engrossing theme. The man with the latest hare-brained theory of the causation of the wind was accorded a full hearing. The lightning calculator who estimated the annual tonnage of drift-snow sweeping off Adelie Land was received as a futurist and thinker. Discussion was always free, and the subject was never thrashed out. Evidence on the great topic accumulated day by day and month by month; yet there was no one without an innate hope that winter would bring calm weather or that spring-time, at least, must be propitious.

Meanwhile the meteorologist accepted things as he found them, supplied the daily facts of wind-mileage and direction, amount of drift, temperature and so forth, which were immediately seized by more vivacious minds and made the basis of daring speculations.

The daily facts were increased by the construction of a new instrument known as the puffometer. It was entirely a home-made contrivance, designed to measure the speed of heavy gusts of wind. A small aluminium sphere was arranged to blow out at the end of a light cord exerting tension on a calibrated spring. The pull was transferred to a lever carrying a pencil, which travelled across a disk of carbonized paper. The disk, moving by clockwork, made a complete revolution every hour. The recording parts of the instrument were enclosed in a snow-proof box in which

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there was a small aperture on the leeward side, through which ran the cord attachment of the sphere. This may give a rough idea of the apparatus employed to measure the momentary velocity of the cyclonic gusts. The idea is not an original one, having been previously applied for use on kites.

It was not always possible to use the puffometer in the strongest gusts because these were often transient, occurring unexpectedly or during the night; while it took a little time to get the instrument into running order. Even in daylight, with the landscape clear of drift, it was a time-absorbing and difficult task to secure a record.

Two men start from the Hut with iron crampons and a full complement of clothes and mitts. Outside they find themselves in a rushing torrent of air, pulsating with mighty gust-waves. Lowered from the estate of upright manhood, they humbly crawl, or make a series of crouching sprints between the gusts. Over the scattered boulders to the east of the Hut, across a patch of polished snow they push to the first low ridge, and there they stop for breath. Up on the side of "Annie Hill," in the local phrase, the tide sweeps by with fiendish strength, and among the jagged rocks the man clutching the puffometer-box has a few desperate falls. At last both clamber slowly to an eminence where a long steel pipe has been erected. To the top of this the puffometer is hauled by means of a pulley and line. At the same time the aluminium sphere is released, and out it floats in the wind tugging at the spring.

The puffometer was left out for an hour at a time, and separate gusts up to one hundred and fifty and one hundred and eighty miles per hour were commonly indicated. I remember the final fate of this invention. While helping to mount it one day, the wind picked me up clear of the ground and dashed myself and the instrument on some rocks several yards away. The latter was badly damaged, but thick clothing saved me from serious injury.

The steadiness of the temperature was a subject for

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debate. The stronger the wind blew, the less variation did the thermometer show. Over a period of several days there might be a range of only four or five degrees. Ordinarily, this might be expected of an insular climate, but in our case it depended upon the fact that the wind remained steady from the interior of the vast frigid continent. The air which flowed over the Hut had all passed through the same temperature-cycle. The atmosphere of the interior, where the plateau stood at an elevation of, say, eight thousand feet, might have a temperature -45° F. As the air flowed northwards over Adelie Land to the sea, it would rise slowly in temperature owing to the increased barometric pressure consequent on the descending gradient of the plateau. At sea-level the temperature of the river of air would be, approximately, -20° F.

Such a rise in temperature due to compression is a well-known phenomenon, referred to as the Foehn effect.

The compression of the atmosphere during the gusts affected the air temperature so considerably that, coincident with their passage, the mercury column could often be seen rising and falling through several degrees. The uniform conditions experienced during steady high winds were not only expressed by the slight variation in the temperature, but often in a remarkably even barometric curve. Thus on July 11 the wind-velocity for twenty-four hours was, throughout, seventy miles per hour; the temperature remaining within a few degrees of -21° F., and the barometric curve did not show as much range as one-twentieth of an inch.

In attending to the many instruments and in gathering the voluminous meteorological data, Madigan had his hands very full. Throughout two years he carried on the work capably and thoroughly. It was difficult to keep the instruments free from the penetrating snow and in good running order. The Robinson anemometer was perhaps the greatest source of worry. Repairs and readjustments



Adelie Land THE PUFFOMETER, DESIGNED TO RECORD
MAXIMUM GUST VELOCITIES *Harley*



Adelie Land MADIGAN VISITING THE ANEMOGRAPH
SCREEN IN A HIGH WIND *Harley*



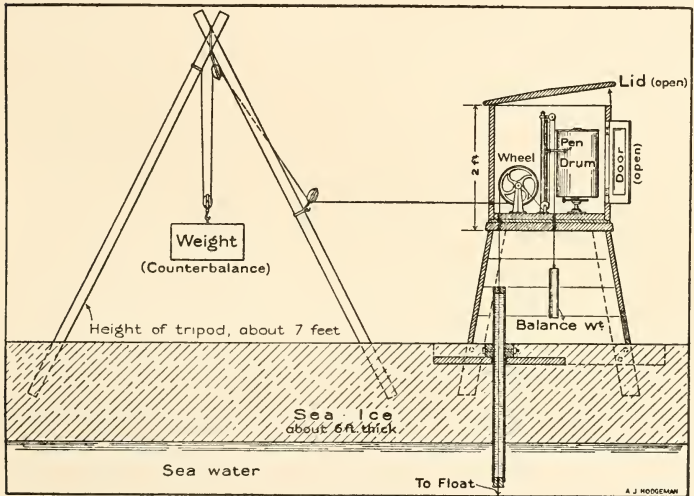
Adelie Land

AN ENORMOUS CONE OF SNOW PILED UP BY THE BLIZZARDS UNDER THE COASTAL CLIFFS

Hurley

MIDWINTER AND ITS WORK

were unavoidable, as the instrument was constantly working at high pressure. In order that these might be carried out efficiently, the whole apparatus had to be carried down to the Hut. Here, Bickerton and Correll were continually in consultation with the meteorologist on the latest breakdown. Cups were blown off several times, and one was lost and replaced with difficulty. Most aggravating



THE TIDE-GAUGE

The rise and fall of the tide is coincident with the movements of a perpendicular wire to which the *Float* is attached. The *Wheel* is revolved, and through wire connections (indicated above) displaces vertically the *Pen*. This traces a record on paper folded on the *Drum* which is driven by clockwork.

In all weathers, the box was enveloped in drift-proof canvas.

of all was a habit the clocks developed of stopping during the colder spells. The old-fashioned method of boiling them was found of assistance, but it was discovered that the best treatment was to put them through successive baths of benzene and alcohol.

The most chronic sufferer throughout the vicissitudes of temperature was the clock belonging to Bage's tide-gauge.

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Every sleeper in the Hut who was sensitive to ticking knew and reviled that clock. So often was it subjected to warm, curative treatment in various resting-places that it was hunted from pillar to post. A radical operation by Correll—the insertion of an extra spring—became necessary at last. Correll, when not engaged designing electroscopes, improving sledge-meters and perfecting theodolites, was something of a specialist in clocks. His advice on the subject of refractory time-pieces was freely asked and cheerfully given. By perseverance and unlimited patience, the tide-gauge down on the harbour-ice was induced to supply a good series of unbroken records.

Antarctica is a world of colour, brilliant and intensely pure. The chaste whiteness of the snow and the velvet blackness of the rocks belong to days of snowy nimbus enshrouding the horizon. When the sky has broken into cloudlets of fleece, their edges are painted pale orange, fading or richly glowing if the sun is low. In the high sun they are rainbow-rimmed.

The clouds have opened into rifts and the sun is setting in the north-west. The widening spaces in the zenith are azure, and low in the north they are emerald. Scenic changes are swift. Above the mounting plateau a lofty arch of clear sky has risen, flanked by roseate clouds. Far down in the south it is tinged with indigo and ultramarine, washed with royal purple paling onwards into cold violet and greyish-blue.

Soon the north is unveiled. The liquid globe of sun has departed, but his glory still remains. Down from the zenith his colours descend through greenish-blue, yellowish-green, straw-yellow, light terra-cotta to a diffuse brick-red; each reflected in the dull sheen of freezing sea. Out on the infinite horizon float icebergs in a mirage of mobile gold. The Barrier, curving to east and west, is a wall of delicate pink overlaid with a wondrous mauve—the rising plateau.

“ANTARCTICA IS A WORLD OF COLOUR, BRILLIANT AND INTENSELY PURE . . .”
Commonwealth Bay

Paget colour photo by Correll



MIDWINTER AND ITS WORK

A cold picture—yet it awakens the throb of inborn divinity.

Despite contrary predictions, there were some enjoyable days in June. Occupation had to be strenuous, making the blood run hot, otherwise the wind was apt to be chill. So the Transit House was founded, and there were many volunteers to assist Bage in carrying the tons of stones which formed its permanent base. The nearest large collection of boulders was twenty yards away, on the edge of a moraine, but these after a while became exhausted. Plenty of rocks actually showed above the surface, but the majority were frozen-in, and, when of suitable size, could only be moved by a heavy crowbar. Some of the men, therefore, dislodged the rocks, while others carried them.

When Bage was wondering how long the supply would last, Ninnis and Mertz came to the rescue with sledges and dog-teams. Boxes were piled on to the sledges and away the teams went, careering across the ice-flat towards the Magnetograph House close to which there were many heaps of stones, wind-swept and easily displaced. Soon a regular service was plying to the foundations, and, at the same time, the dogs were being trained. This occupation was continued, weather permitting, for several weeks before Midwinter's Day. Thus the drivers gained experience, while the animals, with a wholesome dread of the whip, became more responsive to commands. Eagerly the huskies strained at their traces with excited yelps. The heavily laden sledges would break out and start off with increasing speed over the rough ice. The drivers, running at full speed, jumped on the racing loads—Mertz in the lead shouting some quaint yodel song; Ninnis, perhaps, just behind upbraiding a laggard dog.

Midwinter's Day! For once, the weather rose to the occasion and calmed during the few hours of the twilight-day. It was a jovial occasion, and we celebrated it with the uproarious delight of a community of eighteen young

THE HOME OF THE BLIZZARD

men unfettered by small conventions. The sun was returning, and we were glad of it. Already we were dreaming of

Menu du Dîner	
Escoffier Potage à la Reine	
Noisettes de Pêchoque	Claret Tinfara
Haricot Verts	
Champignons en Sauce Antarctique	
Pingouin à la Terre Adélie	Burgundy Chauvénet 1898
Petits Pois à la Menthe	
Pommes Nouvelles	
Asperges au Beurre Fondu	Port Köpke
Plum Pouding Union Jack	
Pâté de Groseilles	
Desserts	
Café	

MIDWINTER'S DAY MENU AT THE MAIN BASE,
ADELIE LAND, 1912

spring and sledging, summer and sledging, the ship and home. It was the turn of the tide, and the future seemed to be sketched in firm, sure outline. While the rest explored all the ice-caves and the whole extent of our small rocky

MIDWINTER AND ITS WORK

“ selection,” Hannam and Bickerton shouldered the domestic responsibilities. Their *menu du diner* to us was a marvel of gorgeous delicacies. After the toasts and speeches came a musical and dramatic programme, punctuated by choice gramophone records and rowdy student choruses. The washing-up was completed by all hands at midnight. Outside, the wind was not to be outdone; it surpassed itself with an unusual burst of ninety-five miles per hour.

CHAPTER X

THE PREPARATION OF SLEDGING EQUIPMENT

THE world of fashion insists on its minute vagaries in dress not always with an eye to utility and an explorer in the polar regions is a very fastidious person, expending a vast amount of care on his attire, but with the sole idea of comfort, warmth, and usefulness. The clothes he wears are many and often cumbersome, but they have gradually been perfected to meet the demands of the local weather conditions. After a sojourn in the ice-lands, he returns to civilization with a new concept of the value of dress. At last he can stand still without being reminded that his feet are chilly; he experiences the peculiar sensation of walking about in an airily light suit, in glove-tight boots, without helmet or mitts. It gives him such a delicious feeling of freedom that his energy is unbounded and life is a very pleasant and easy thing. Then it is that he can turn in retrospect to the time in exile, appreciate his altered circumstances and recall the many ingenuities which were evolved to make him master of his environment.

It is sufficient to say that we found the proposition of clothing one of unusual interest. Any one who was not a practised needleman and machinist was handicapped for a time, until he fell into the ways of the through-and-through and blanket-stitch, thimbles, shuttles, spools and many other things he had once affected to despise as belonging to the sphere of women's work. It was not long before he was an enthusiast in many arts attaining to a stage of independence, in which he patented new ideas and maintained them in hot opposition to the whole community

THE PREPARATION OF SLEDGING EQUIPMENT

of the Hut. On some fundamental points all were in agreement, and one of them was that Adelie Land was the country *par excellence* for the wind-proof, drift-tight burberry.

Outside all other garments the burberry gabardine was worn. The material was light and loosely fitting, but in wind and drift it had to be hermetically sealed, so to speak, for the snow crept in wherever there was an aperture. The trousers were of double thickness, as they were exposed to the greatest wear. Attached by large buttons, toggles or lamp-wick braces, they reached as high as the lower part of the chest. Below, they had lamp-wick lashings which were securely bound round the uppers of boots or finnesko. In walking, the trousers would often work off the leather boots, especially if they were cut to a tailor's length, and snow would then pour up the leg and down into the boots in a remarkably short time. To counteract this, Ninnis initiated the very satisfactory plan of sewing a short length of canvas on to the boots to increase the length of the upper.

The burberry helmet and blouse were either in one piece or separate. For use round the Hut, in thick drifts, the combination of helmet and blouse was handy and time-saving. For sledging, when low temperatures and strong winds might be expected all the time, it met the conditions well; there being no necessity to worry about keeping the neck drift-tight. Under ordinary circumstances it was very convenient to have a blouse and helmet detached, as one so often could wear the former with a well-padded woollen helmet and be reduced only as a last resource to wearing the burberry helmet.

The blouse was roomy, giving great freedom of movement. Around the neck was a draw-string, which bunched in the jacket tightly over the lower part of the helmet. There was also a draw-string round the waist. It was here that we had the greatest difficulty in making the garment fit snow-tight. If simply tied, the blouse would soon slip up from below, especially if one were working with pick and

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shovel, carrying cases or blocks of ice. To obviate this, some of the men sewed loops or tags of lamp-wick on to the sides of the trousers, to connect with corresponding attachments on the blouse. As an additional security, others wore an outside belt which was, even if the blouse slipped up for some distance, a line of defence against the drift-snow.

The burberry helmet completely enclosed the head except for the face, which remained uncovered at the bottom of a funnel stiffened by several rings of copper-wire. Lamp-wick, the universal polar "cord," was sewn in short strips in front of the ears and tied at the back of the head, firmly securing the helmet. Since the voyage of the *Discovery* (1901-1904) lamp-wick had been used widely in sledging on account of its width, softness, comparative warmth and because of the fact that ordinary cord is not so easy to manipulate in cold weather. Large buttons of leather or bone were not nearly so popular as small, smooth lengths of stick engaging cross-wise with loops of cord—known as toggles, which became quite a mania with some members of the Expedition. Whetter, for instance, was known as the "Toggle King," because of the multitude of these stick-and-cord appendages which hung from every part of his clothing.

Under the burberrys thick, but light, suits of Jaeger fleece were worn. They combined trousers and a sleeveless coat, over which a woollen jersey was worn. In calm weather these with underclothing were all-sufficient, but in the average fifty-mile wind at any temperature in the neighbourhood of zero Fahrenheit, they felt distinctly porous.

In less windy weather the luxury of discarding burberrys, either partly or wholly, was an indulgence which gave great satisfaction.

Finnesko were the favourite foot-gear—soft and commodious reindeer-skin fur boots. Once these were stuffed with Lapp saennegras or manilla fibre, and the feet covered with several pairs of socks, cold could be despised unless one were stationary for some time or the socks or padding



Adelie Land

THE CLIFFS AT LAND'S END, CAPE DENISON. ON THE BROW OF THE CLIFF IN FRONT OF THE
FIGURE (MERTZ) IS A GOOD EXAMPLE OF A SNOW CORNICE

Harley



THE PREPARATION OF SLEDGING EQUIPMENT

became damp. Even though the padding were wet, violent exercise kept the temperature "balance" in the warm direction, especially if one were also under the stimulus of a recent hot meal.

Of course, on smooth ice or polished snow in even moderate winds it was useless to try and keep one's feet in finnesko, although practice gave great agility in calmer weather. As already indicated, spiked crampons on approved models, tested on the glacier-slopes in a hurricane wind, were almost always worn encasing the finnesko. With so many coverings the feet often became uncomfortably hot, and for odd jobs about the Hut and not far abroad spiked leather boots gave most satisfaction.

There were various coverings for the hands: felt mitts, mittens, instrument-gloves and wolfskin mitts.

The first were used in conjunction with fingerless mittens. The wear and tear on these was greater than on any other item of clothing. It was a common sight to see them ragged, canvas-covered, patched, repatched and again repatched, to be at last reluctantly thrown away. There were two compartments in a single glove, one for the thumb and the other for the fingers. It is much easier to keep the fingers warm when in contact with one another than by having them in separate stalls.

Instrument-gloves of wool were used for delicate manipulations, as a partial protection, since they reduced the stinging chill of cold metal at low temperatures.

Wolfskin mitts are unexcelled for use in cold windy weather. Their shaggy external hair entangles the drift-snow, which thaws, soaks the skin and refreezes until the mitt is stiff as buckram. This is their main disadvantage. These mitts or rather gauntlets were made longer in the arms than usual so as to overlap the burberry sleeves and keep the wrists warm.

Lambskin mitts with the wool facing inwards were very useful and wore well for occupations like hauling on ropes and lifting cases.

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Like every other movable thing, mitts had to be made fast to prevent them blowing away. So they were slung round the neck by a yoke of lamp-wick. The mittened hand could then be removed with the assurance that the outer mitt would not be far away when it was wanted, no matter how hard the wind blew.

There has been much discussion as to the relative merits of fur and woollen clothing. After all the question has resolved itself into one of personal predilection. It has been claimed that furs are warmer and lighter. The warmth follows from the wind-proof quality of the hide which, unfortunately, also tends to retain moist exhalations from the body. In Adelie Land, the only furs we used were finnesko, wolfskin mitts and sleeping-bags of reindeer skins.

As in every part of the equipment, modifications had to be made in the circular Willesden-drill tents. To facilitate their erection in the perpetual winds they were sewn permanently on to the five bamboo poles, instead of being thrown over the latter previously set in position. Thus the tents opened like large conical umbrellas. A raw-hide loop was fixed to the middle one of the three windward legs and, when raising a tent during a high wind, it was the usual thing for a man to be inside gripping the loop to pin down the windward legs and at the same time, kicking out the two leeward legs. On hard surfaces, holes were dug to receive the ends of the poles; at other times they were pressed home into the snow by the man inside the tent.

When pitched, the tent was held down by blocks of snow or ice, helped by spare food-bags, which were all piled round on a broad flounce. Ventilators, originally supplied with the tents, had to be dispensed with on account of the incessant drift. The door of the tent was an oval funnel of burberry material just large enough to admit a man and secured by a draw-string.

Strips of calico and webbing were sewn over the insides of the light tents to strengthen them for sledging in the

THE PREPARATION OF SLEDGING EQUIPMENT

summer. For heavy weather we also had japara sail-cloth tents with Willesden canvas flounces. These gave one a feeling of greater security and were much more wind-proof, but unfortunately twice as heavy as the first-mentioned.

A floor-cloth of light Willesden canvas covered the surface of snow or ice in the interior of the tent ; performing when sledging the alternative office of a sail.

In order to cut snow, *nêvé* or ice to pile on the flounce, a pick and spade had to be included in the sledging equipment. As a rule, a strong, pointed shovel weighing about six pounds answers very well ; but in Adelie Land, the surface was so often wind-swept ice, polished porcelain-snow, or hard *nêvé* that a pick was necessary to make any impression upon it. It was found that a four-pound spade, carefully handled, and a four-pound miner's pick provided against all emergencies.

Our sledges were similar to those of other British Antarctic expeditions ; of eleven- and twelve-foot lengths. The best were Norwegian, made of ash and hickory. Others built in Sydney, of Australian woods, were admirably suited for special work. Those made of mountain-ash had the advantage of being extremely light, but the runners wore out quickly on ice and hard *nêvé*. Sledges of powellized spotted gum were very strong and stood plenty of rough usage, but were heavier than those procured in Norway. A decking of bamboo slats secured by copper-wire to the crossbars was usually employed.

A light bamboo mast and spar were fitted to each sledge. Immediately in front of the mast came the "cooker-box," containing in respective compartments the primus and a bottle of spirit for lighting it, as well as spare prickers, openers and fillers for the kerosene tins, repair outfits and other odd articles. The cooker-boxes were of Venesta board, with hinged lids secured by chocks and overlapped by japara cloth to exclude as much drift-snow as possible. An instrument-box was secured to the sledge near the rear and just forward of a Venesta or aluminium tray on which

THE HOME OF THE BLIZZARD

the kerosene contained in one-gallon tins was carried. In several cases the tray was widened to receive as well a case containing a dip-circle. Rearmost of all was a wooden crosspiece to which the shaft of the sledge-meter was attached through a universal joint. On the middle section of the sledge between the cooker-box and instrument-box, sleeping-bags, food-bags, clothes-bags, tent, alpine rope, theodolite legs, and other articles, were arranged, packed and immovably stiffened by buckled straps passing from side to side.

Sledging harness for both men and dogs was constructed of canvas. In the former case, a wide belt of triple thickness encircled the body at the hips, sewn to braces of narrower strips passing over the shoulders, while hauling-rope was attached to the belt behind. The strength of the whole depended on the care bestowed in sewing the parts together, and, since his life might depend upon it, no one made anything else but a thorough job of his harness.

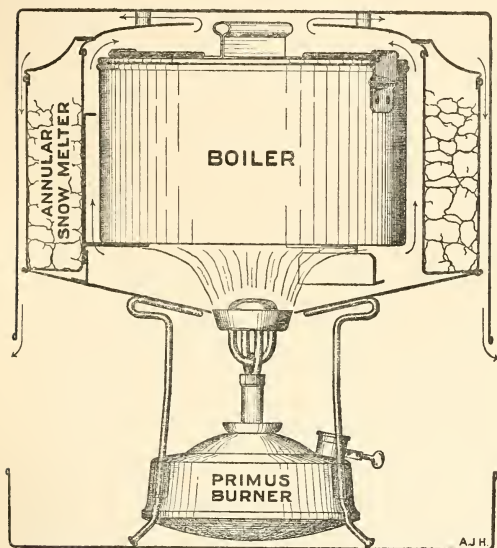
Ninnis and Mertz ran a tailoring business for the dogs, who were brought one by one into the outer Hut to be measured for harness. After many lengths had been cut with scissors the canvas bands were put through and sewn together on the large sewing-machine and then each dog was fitted and the final alterations were made. The huskies looked quite smart in their "suits."

Upon the primus heater, alone, did we rely for cooking the meals on sledging journeys. First used for purposes of sledging by Dr. Nansen in his journey across Greenland, the primus is only economically managed after some practice. To light a primus in a draughty tent at a low temperature calls for some forbearance before one is a thorough master of the art. A sledging cook will often make a disagreeable *fauæ pas* by extinguishing the primus in the preparation of hoosh. This is most readily done by lowering too quickly the outside cover over the rest of the cooker. Fumes of vaporizing kerosene soon fill the tent and when matches are found, the cooker pulled to pieces, the primus relighted and

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the choking vapours have cleared, one is apt to think that all is well. The hoosh is quite as successful as usual, but the cocoa, made from water in the annulus, has a tincture of kerosene which cannot be concealed.

In the "Nansen Cooker," which we used, a maximum result is secured from the heat of the primus.



SECTION THROUGH A NANSEN SLEDGING COOKER MOUNTED ON THE PRIMUS

The hot gases from the combustion of the kerosene, before they escape into the outside air, have to circulate along a tortuous path, passing from the hot interior to the colder exterior compartments, losing heat all the time. Thus a hot hoosh is preparing in the central vessel side by side with the melting of snow for cocoa or tea in

the annulus. By the combination of "Nansen Cooker" and primus stove one gallon of kerosene oil properly husbanded is made to last for twelve days in the preparation of the ordinary ration for three men.

The subject of food is one which requires peculiar consideration and study. It is assumed that a polar expedition must carry all its food-stuffs in that variety and quantity which may approximately satisfy normal demands. Fortu-

THE HOME OF THE BLIZZARD

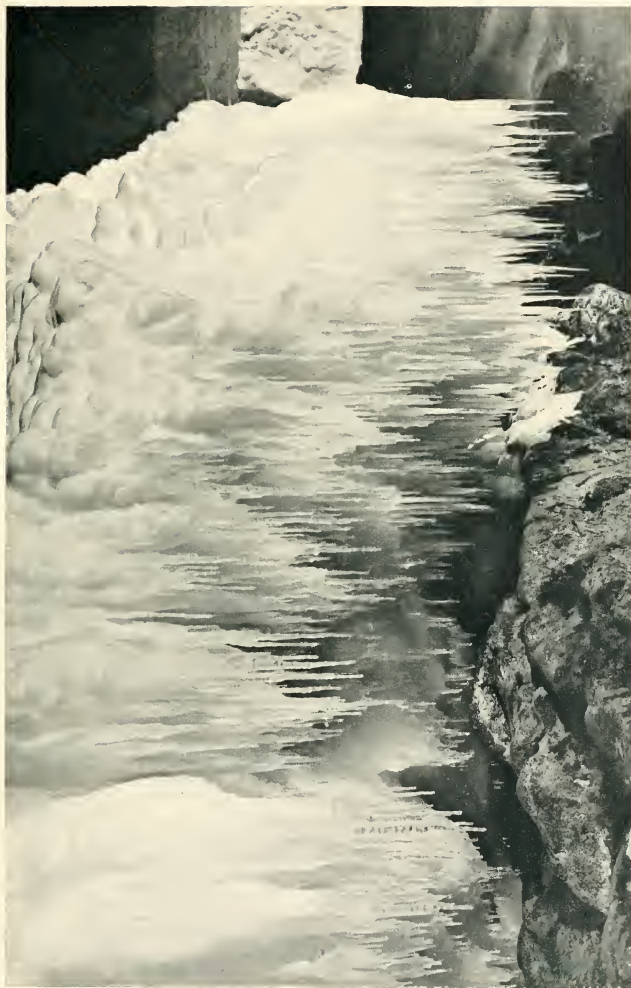
nately, the advance of science has been such that necessaries like vegetables, fruit, meats and milk are now preserved so that the chances of bacterial contamination are reduced to a minimum. A cold climate is an additional security towards the same end.

Speaking generally, while living for months in an Antarctic hut, it is a splendid thing to have more than the mere necessaries of life. Since one is cut off from the ordinary amenities of social existence, it is particularly necessary that equipment and *food* should be of the very best; in some measure to replace a lack which sooner or later makes itself keenly felt. Explorers, after all, are only mortal.

Luxuries, then, are good in moderation, and mainly for their psychological effect. After a spell of routine, a celebration is the natural sequel, and if there are delicacies which in civilization are more palatable than usual, why not take them to where they will receive a still fuller and heartier appreciation? There is a corresponding rise in the "tide of life" and the ennui of the same task, in the same place, in the same *wind*, is not so noticeable. So we did not forget our asparagus and jugged hare.

In the matter of sledging foods, one comes down to a solid basis of dietetics. But even dietetics as a science has to stand aside when actual experience speaks. Dietetics deals with proteins, carbohydrates, fats, and calories: all terms which need definition and comprehension before the value of a sledging ration can be fundamentally understood. When the subject was first introduced into table conversation at the Hut, it was regarded somewhat suspiciously as "shop." But it gradually won interest simply because it was of such vital concern.

In sledging there is undoubtedly a critical allowance which will yield the best results. Circumstances alter cases, and the correct ration under one set of conditions cannot be expected to coincide with that in another situation. Thus, the journey may be conducted under conditions of



Harley

ICE STALACTITES DRAPING THE FORESHORES

Cape Denison



THE PREPARATION OF SLEDGING EQUIPMENT

great cold or of comparative warmth, by man-hauling or auxiliary power, at sea-level or on an altitude, through regions where there is a reasonable hope of securing additions of meat by the way, or across barren tracts devoid of game. In each instance particular demands must be supplied.

In selecting the articles of diet, idiosyncrasies of individuals should be consulted in reason, and under no consideration should anything be taken which bears the slightest stigma of contamination. It remains, then, to discriminate those foods which contribute the greatest amount of nutriment for a given weight, and which, *inter se*, preserve a proper dietetic balance. Variety is very desirable, provided that there is no important sacrifice in nutrient value. The proof of a wisely selected ration is to find at the end of a long sledge journey that the sole craving is for an increase in the ration. Of course, such would be the ideal result of a perfect ration, which does not exist.

Considering that an ordinary individual in civilization may only satisfy the choice demands of his appetite by selecting from the multifarious bill of fare of a modern restaurant, it will be evident that the same person, though already on the restricted diet of an explorer, cannot be suddenly subjected to a sledging ration for any considerable period without a certain exercise of discipline.

For example, the Eastern Coastal Party, sledging at fairly high temperatures over the sea-ice, noted that the ull ration of hoosh produced at times a mild indigestion, they drank much liquid to satisfy an intense thirst and on returning to the Hut found their appetites inclined to tinned fruit and penguins' eggs. Bickerton's and Bage's parties, though working at a much higher altitude, had a similar experience. The former, for instance, could not at first drink the whole allowance of thick, rich cocoa without a slight nausea. The latter saved rations during the first two weeks of their journey, and only when they rose to greater heights and were in fine condition did they appreciate

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the ration to the full. Again, even when one becomes used to the ration, the sensation of full satisfaction does not last for more than an hour. The imagination reaches forward to the next meal, perhaps partly on account of the fact that marching is often monotonous and the scenery uninspiring. Still, even after a good evening hoosh, the subconscious self may assert itself in food-dreams. The reaction from even a short sledging trip, where food has been plentiful, is to eat a good deal, astonishing in amount to those who for the time being have lived at the Hut.

It may appear that a serious case is being made against the polar sledging ration. On the whole, it was found to be excellent and the best that experience had been able to devise. Entering the polar zones, one must not be over-fastidious, but take it as a matter of course that there will be self-denial and deprivation of small luxuries.

The energy exerted by man, and the requirements of tissue-building are derived from the organic compounds known as proteins,* fats and carbohydrates, though in a slight degree from other substances, most important of which are minute quantities of mineral matter.

A calorie as used in dietetics is the amount of heat required to raise the temperature of one kilogramme of water at 0° C. to 1° C. The heat-value of food-stuffs, stated in calories, can be quickly reckoned when chemical analyses stating their protein, fat and carbohydrate contents are available. It has been ascertained that one gramme of

* The *proteins* are complex nitrogenous compounds which are pre-eminent in fulfilling the two functions of a food: to form tissue and to produce work and heat. As examples may be quoted, myosin the chief protein of ordinary meat or muscle, ovalbumin one of the proteins of egg-white, casein belonging to milk and cheese, and gluten a protein-mixture in flour.

Fats are organic non-nitrogenous substances obtained from both animal and vegetable sources, e.g. butter and olive oil.

The *carbohydrates* are compounds of carbon with hydrogen and oxygen in a certain proportion, e.g. cane-sugar and starch.

Mineral matters are inorganic, being chlorides, carbonates or phosphates of calcium, sodium and potassium.

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protein or carbohydrate yields 4·1 calories, whilst the same amount of fat produces 9·3 calories. Thus the value of fat-containing foods in a sledging ration is at once apparent.

Theoretically, any of the three classes of foods mentioned might be thought to supply adequate energy, if taken in sufficient amount. Practically, however, protein and carbohydrate are essential, and it is better to have a mixture of all three. So, in concentrating foods for sledging, the largest possible proportion of fat, compatible with other considerations, is included.

Ordinarily, a normal man consumes some four or five pounds weight of solid food per diem, of which 50 per cent., it is rather surprising to learn, is water. When sledging, one has the satisfaction of knowing that all but the smallest quantity of the food dragged is solid nutriment. The water is added when the meals are cooked. It is just in this artificial addition that the sledging ration is not perfect, though as a synthesis it satisfies the demands of dietetics. Food containing water, as cooked meat oozing with its own gravy is a more palatable thing than dried meat-powder to which boiling water has been added. In the same way, a dry, hard biscuit plus liquid is a different thing from a spongy loaf of yeast bread with its high percentage of water. One must reckon with the psychic factor in eating. When sledging, one does not look for food well served as long as the food is hot, nourishing and filling. So the usage of weeks and a wolfish appetite make hoosh a most delicious preparation; but when the days of an enforced ration are over, the desire for appetizing well-served food reasserts itself. The body refuses to be treated merely as an engine.

The daily polar sledging ration for one man has been concentrated to a figure just above two pounds in weight, For instance, in recent Antarctic expeditions, Scott, in 1903, used 34·7 ozs., Shackleton in 1908 used 34·82 ozs. and our own amounted to 34·25 ozs. Exclusive of tea, pepper and salt, Shackleton's ration and that adopted by Wild at the

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Western Base and ourselves in Adelie Land were identical—34 ozs. Reverting to earlier explorers, for the sake of comparisons, McClintock in 1850 brought his minimum down to 42 ozs., Nares in 1875 to 40 ozs., Greely in 1882 to 41·75 ozs., and Abruzzi in 1900 to 43·5 ozs.

Our allowance was made up as follows, the relative amounts in the daily sledging ration for one man being stated: plasmon biscuit, 12 ozs.; pemmican, 8 ozs.; butter, 2 ozs.; plasmon chocolate, 2 ozs.; glaxo (dried milk), 5 ozs.; sugar, 4 ozs.; cocoa, 1 oz.; tea, ·25 oz. It will be instructive to make a short note on each item.

Plasmon biscuit was made of the best flour mixed with 30 per cent. of plasmon powder. Each biscuit weighed 2·25 ozs., and was made specially thick and hard to resist shaking and bumping in transit as well as the rough usage of a sledging journey. The effect of the high percentage of plasmon, apart from its nutritive value, was to impart additional toughness to the biscuit, which tested our teeth so severely that we should have preferred something less like a geological specimen and more like ordinary "hard tack." The favourite method of dealing with these biscuits was to smash them with an ice-axe or nibble them into small pieces and treat the fragments for a while to the solvent action of hot cocoa. Two important proteins were present in this food: plasmon, a trade-name for casein, the chief protein of milk, and gluten, a mixture of proteins in flour.

The pemmican we used consisted of powdered dried beef (containing the important protein, myosin) and 50 per cent. of pure fat in the form of lard. The large content of fat contributes to its high caloric value, so that it is regularly included in sledging diets. Hoosh is a stodgy, porridge-like mixture of pemmican, dried biscuit and water, brought to the boil and served hot. Some men prefer it cooler and more dilute, and to this end dig up snow from the floor of the tent with their spoons, and mix it in until the hoosh is "to taste." Eating hoosh is a heightened form of bliss which no sledger can ever forget.

THE PREPARATION OF SLEDGING EQUIPMENT

Glaxo is a proprietary food preparation of dried milk, manufactured in New Zealand. It is without doubt an ideal food for any climate where concentration is desirable and asepsis cannot be neglected. The value of milk as an all-round food is well known. It contains protein as casein, fat as cream and in fine globules, carbohydrate as lactose (milk sugar) and mineral substances whose importance is becoming more recognized. At the Western Base, Wild's party invented glaxo biscuits; an unbaked mixture of flour and dried milk, which were in themselves a big inducement to go sledging. At the Hut, making milk from the dried powder required some little experience. Cold water was added to the dried powder, a paste was made and warm or hot water poured in until the milk was at the required strength. One of the professional "touches" was to aerate the milk, after mixing, by pouring it from jug to jug.

Butter, although it contains nearly 20 per cent. of water, is a food of high heat-value and is certainly more easily digested than fat, such as dripping, with a higher melting-point. Ours was fresh Victorian butter, packed in the ordinary export boxes, and carried to the Antarctic on the open bridge of the *Aurora*. With a sheath-knife, the sledging cook cut off three small chunks of two ounces each from the frozen butter every day at lunch. To show how the appetite is affected by extreme cold, one feels that butter is a wholesome thing just in itself, being more inclined to eat a pound than two ounces.

Sugar—the carbohydrate, sucrose—has special qualities as a food since it is quickly assimilated, imparting within a few minutes fresh energy for muscular exertion. Athletes will support this; in fact, a strong solution of sugar in water is used as a stimulant in long-distance running and other feats of endurance. Wild, for instance, found as a matter of experience that chocolate was preferable to cheese as a sledging food, even though similar weights had approximately the same food-value.

Cocoa and tea were the two sledging beverages. The

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cocoa was used for two meals, the first and the last in the day, and the tea for lunch. Both contain stimulating alkaloids, theobromine and caffeine, and fat is a notable constituent of cocoa. Of course, their chief nourishing value, as far as we were concerned, lay in the glaxo and sugar added.

Lastly, plasmon chocolate is a preparation of pure chocolate (a mixture of ground cocoa, white sugar and starch) with the addition of 10 per cent. of plasmon.

As food for the dogs, there was nothing better than dried seal-steaks with the addition of a little blubber. Ordinary pemmican is readily eaten, but not appreciated by the dogs in the same way as seal meat. To save weight, the meat was dried over the stove without heating it sufficiently to cook it. By this measure, almost 50 per cent. in weight was saved.

The Hut was all agog with movement and bustle on the days when rations were being made up and packed. Starting from the earliest stage in the process, there would be two men in the outer Hut grinding plasmon biscuit into powder. One would turn away for dear life and the other smash the biscuit with a hammer on a metal slab and feed continuously into the grinder. The atmosphere would be full of the nauseous vapours of blubber arising from dishes on the stove where seal meat was drying for the dogs. Ninnis and Mertz superintended in this department, in careless moments allowing the blubber to frizzle and diffuse its aroma through the Hut.

Inside, spread along the eighteen-foot table would be the weighers, the bag-makers or machinists, and the packers. The first made up a compound of cocoa, glaxo and sugar—cocoa compound; mixed glaxo and sugar and stirred together, pemmican and biscuit—pemmican compound. These were weighed and run into calico bags, rapidly supplied by several machinists farther along the table. In spare moments the weighers stowed chocolate, whole biscuits, butter and tea into



THE RELIEF OF WILD'S PARTY. THE *AURORA* APPROACHING
THE FLOE AT THE WESTERN BASE, FEBRUARY 1913 *Hurley*



PACING THE DECK: CAPT. JOHN KING DAVIS AND
CAPT. JAMES DAVIS *Hurley*



AN ADELIE PENGUIN FEEDING ITS YOUNG

Harley

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sacks of various sizes. Lastly, the packers had strong canvas tanks, as they were called, designed to hold food for a week and a fortnight respectively. Into these the rations were carefully distributed, butter in the centre, whole biscuits near the top. Then the tanks were tightly closed, and one man operated with palm and sail-needle, sewing them up with twine. At the same time, a side-line was run in pemmican which was removed semi-frozen from the air-tight tins, and shaved into small pieces with a strong sheath-knife. Butter, too, arrived from the refrigerator-store and was subdivided into two-ounce or pound lumps.

Meanwhile, other occupations were in full swing. An amateur cobbler, his crampon on a last, studded its spiked surface with clouts, hammering away in complete disregard of the night-watchman's uneasy slumbers. The big sewing-machine raced at top-speed round the flounce of a tent, and in odd corners among the bunks were groups mending mitts, strengthening sleeping-bags and patching burberrys. The cartographer at his table beneath a shaded acetylene light drew maps and sketched; the magnetician was busy on calculations close by. The cook and messman often made their presence felt and heard. In the outer Hut, the lathe spun round, its whirr and click drowned in the noisy rasp of the grinder and the blast of the big blow-lamp. The last-named, Bickerton, "bus-driver" and air-tractor expert, had converted, with the aid of a few pieces of covering tin, into a forge. A piece of red-hot metal was lifted out and thrust into the vice; Hannam was striker and Bickerton holder. General conversation was conducted in shouts, Hannam's being easily predominant.

The sum total of sounds was sufficient for a while to make every one oblivious to the clamour of the restless wind.

CHAPTER XI

SPRING EXPLOITS

IF the "winter calms" were a delusion, there were at least several beautifully clear, moderately calm days in June. The expectation of colder weather had been realized, and by the end of the month it was a perceptible fact that the sun had definitely turned, describing a longer arc when skimming the distant fleets of bergs along the northern horizon. Thus on June 28 the refracted image of the sun rose into visibility about eleven o'clock, heralded by a vivid green sky and damask cloud and by one o'clock had disappeared.

On the same day every one was abroad, advancing the wireless masts another stage and digging ice-shafts. Stillwell commenced a contoured plane-table survey of the neighbourhood of Winter Quarters. He continued this with many breaks during the next few months and eventually completed an accurate and valuable map, undeterred by the usual series of frost-bites.

There was much anticipated of July, but the wind sougled on and the temperature decreased. Just to demonstrate its resource, the wind maintained ninety-seven miles per hour for six hours on July 19, while the puff-anemometer indicated several "breaks" of one hundred and fifty miles per hour.

July 21 was cold, calm and clear. For the first time after many weeks the sun was mildly warm, and all felt with a spring of optimism that a new era had begun. The sea which had been kept open by the wind was immediately overspread with thin, dark ice, which in a few hours was



"AMUNDSEN." ONE OF THE SLEDGE DOGS SENT DOWN TO US *Hurley*
FROM AMUNDSEN'S SOUTH POLAR EXPEDITION



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dotted with many ice-flowers—aggregates of fern-like, sprouting fronds similar to small bouquets or rosettes. Soon the surface had whitened and thickened and by next morning was firm enough to hold a man out beyond the nearest island. The wind did not allow this state of affairs to last for long, for by lunch-time it had hurried away the wide floes and raged across a foaming sea.

We still considered the question of sledging, and I decided that if there were the slightest prospect of accomplishing anything, several of us would start before the end of July on a short journey. The month, however, closed with nothing to commend it. The night-watchman for July 29 says :

“The moon was wonderfully bright to-night, encircled by a complete halo. It appeared to hang suspended like a silver globe in the dark blue sky. The stars flash and sparkle and seem much nearer here than in Australia. At midnight the wind blew at ninety miles per hour, so that it was no easy job getting to the screen in slippery finnesko. Away in the north there was a dense cloud of spray and sea-smoke, and the wind screamed past the Hut. The ‘St. Elmoscope’ was buzzing merrily in the roof all the time.”

Ninnis and Mertz with a team of dogs managed, on the morning of the 29th, to get several loads of forty pounds over the first steep rise of the glacier to Webb’s magnetic ice-cave against a “blow” of seventy miles per hour.

August 1 was marked by a hurricane, and the celebration in the evening of Swiss Confederation Day. Mertz was the hero of the occasion as well as cook and master of ceremonies. From a mysterious box he produced all kinds of quaint conserves, and the menu soared to unknown delicacies like “Potage à la Suisse, Choucroute garnie aux saucission de Berne, Purée de foie gras truffée, and Leckerley de Bâle.” Hanging above the buoyant assembly were the Cross of Helvetia and the Jack of Britannia.

It was not till August 8 that there was any indication

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of improvement. The sun was bright, the barometer was steady, the wind fell to forty miles an hour and a fine radiant of cirrus cloud spread out fan-like from the north; the first from that direction for months.

On the afternoon of August 9, Ninnis, Madigan and I set off with a team of dogs against a forty-mile wind in an attempt to push to the south. Darkness was coming on when we sighted a bamboo pole, three and a quarter miles south of the Hut, and camped. The dogs pulled well up the steep slopes, but the feet of several were cut by the sharp edges of the wind-worn ice.

Very heavy gusts swept by in the early morning hours of the 10th. and when the time came to get out of our sleeping-bags it fell calm for a short space. We had taken down the tent and had started to move away, when back rushed the wind, strong and steady. Still we pushed on with our willing team and by a piece of good fortune reached the sledge which had been abandoned in the autumn, five and a half miles from the Hut, and of whose fate in the winter's hurricanes we had made all kind of conjectures.

On its leeward side there was a ramp of very hard snow slanting down from the top of the sledge. To windward the low pedestal of ice on which the runners stood was hollowed out, and the wood of the rails and cross-bars, the leather straps, tent, floor-cloth and canvas food-tanks were all bleached and worn. The aluminium cooker, strapped on its box, was brightly polished on the weather side by the dry, drifting snow impelled by the furious winds. A thermograph, left behind in the autumn, was found to be intact and indicated a temperature of -35° F.—the lowest for the eight days during which it had run. The remains of Madigan's plum-pudding of the autumn were unearthed and found in splendid condition. That evening it was thawed out over the primus and we demolished it, after a pause of over five months since having the first cut.

At this spot the steepest grades of the ascent to the plateau were left behind, and it appeared to be a strategic



Adelie Land

Harley

AT ALADDIN'S CAVE. THE VERTICAL PASSAGE LEADING DOWN INTO THE CAVE ITSELF IS SITUATED IMMEDIATELY BEHIND THE FIGURE ON THE RIGHT



Adelie Land

BENEATH THE SURFACE OF THE PLATEAU. BAGE PREPARING A MEAL IN ALADDIN'S CAVE IN AUGUST

Metz



LASERON AND HUNTER USING THE COLLAPSIBLE STEEL HAND-CART IN PREPARING FOR DREDGING ON THE FROZEN SEA *Mawson*



GREENLAND SLEDGING DOGS—"JOHN BULL" AND "GINGER"—TETHERED ON THE ROCKS ADJACENT TO THE HUT

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point from which to extend our sledging efforts. The main difficulty was that of pitching camp in the prevailing winds on a surface of ice. To obviate this, the only expedient was to excavate a shelter beneath the ice itself; and there was the further consideration that all sledging parties would be able to make use of such a haven and save extra wear on their tents.

On the morning of August 11 Madigan and Ninnis commenced to sink a deep vertical trench, at one end of which a room was hewn out large enough to accommodate three men. The job was finished on the following day, and we struck the tent and moved to our new abode. The tent was spread over the vertical shaft which served as the entrance.

It was a great relief to be in a strong room, with solid walls of ice, in place of the cramped tent flapping violently in the wind. Inside, the silence was profound; the blizzard was banished. Aladdin's Cave it was dubbed—a truly magical world of glassy facets and scintillating crystals.

Shelves were chipped out at a moment's notice for primus stove, spirit bottle, matches, kerosene and other oddments. At one side a small hole was cut to communicate with a narrow fissure which provided ventilation without allowing the entrance of drift snow. Whatever daylight there was filtered through the roof and walls without hindrance. A small crevasse opened near at hand and was a natural receptacle for rubbish. The purest ice for cooking could be immediately hacked from the walls without the inconvenience of having to don one's burberrys and go outside for it. Finally, one neatly disposed of spare clothes by moistening the corner of each garment and pressing it against the wall for a few seconds, where it would remain hanging until required. The place, in fact, was simply replete with conveniences. We thoroughly enjoyed the night's rest in Aladdin's Cave, notwithstanding alarming cracks proceeding occasionally from the crevasses around.

Madigan and Ninnis dug a shelter for the dogs, which spent their time curled up so as to expose as little surface as

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possible to the biting wind. Their thick coats did not adhere to a snow surface, but readily became frozen down to ice, so that an ice-axe would have to be used to chip them free.

On August 13, though there was a steady, strong wind blowing, we continued our advance to the south. The dogs hated to face wind, but, on the whole, did better than expected. In the afternoon, when only eight miles south of Winter Quarters and at an altitude of two thousand feet, dark and lowering clouds formed overhead, and I decided to give up any idea of going farther out, for the time being. We had provisions for a few days only, and there was every indication of thick, drifting weather, during which, in the crevassed ice of that vicinity, it would not be advisable to travel.

After deposing a pick, shovel and some pemmican, we started back, thinking it might be possible to reach the Hut the same night. However, driven by a strong wind over a polished, slippery surface split into small crevasses, down a grade which steepened quickly, we required to have all our senses vigilant. Two of the dogs remained in harness and the rest were allowed to run loose ahead. These two strained every effort to catch up to their companions.

We retarded the sledge as much as possible and all went well for a few minutes. Then the wind slewed the sledge, the runners struck an irregularity in the surface and the whole capsized. This happened repeatedly, until there was nothing to do but loose the two remaining dogs and drag the sledge ourselves. The dogs were soon lost to sight, except Pavlova, who remained with us all the time. As the hours of light were short in August, darkness had come before Aladdin's Cave was reached, and it was with some relief that we saw the sledge, flag-pole and the expectant dogs suddenly loom up in front. The sleeping-bags and other gear were passed down into the Cave and the dogs were fed.

When the doorway was opened in the morning, August 14, a blizzard with dense drifting snow was in full progress. As

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it was not possible to see any distance, and as our quarters were very comfortable, we decided to wait for another day. Madigan and Ninnis went out and fed the dogs, who were all snugly curled up in beds of snow.

The weather was no better on the 15th, but, as we were only five and a half miles from the Hut, which was more comfortable and where there was much work to be done, it seemed a shame to remain cooped up in idleness. Madigan and Ninnis were both strongly in favour of making a dash for the Hut, so we set off.

The sledge having been dug out, one man went in front to keep the course and two men brought up the rear, holding back the load. With long-spiked Swiss crampons we could hold up very well on the ice. In dense drift it was not a simple matter to steer a correct course for the Hut and it was essential not to deviate, as the rocky foreshores near which it stood extended only for a mile east and west; on either side abutting on vertical ice-cliffs. With a compelling force like a hurriance at our backs, it was not a nice thing to contemplate finding ourselves on the brink of a precipice.

The wind, however, was steady, and we knew at what angle to steer to keep a rough course; and we were also helped by a number of small crevasses between three and five and a half miles which ran approximately north and south.

Half a mile had been covered before we remarked the absence of the dogs which had been left to follow. We had taken for granted that they would follow us, and were so fully occupied after starting that their absence had passed unnoticed. It would be difficult to locate them if we returned; the weather would improve in a few days; if they felt hungry they would come down of their own accord. So we decided to go on without them.

At two miles from the Hut the drift thinned out and the wind became more gusty. Between the gusts the view ahead opened out for a considerable distance, and the rocks soon showed black below the last steep fall.

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Back at the Hut it was arranged that if the dogs did not return in a reasonable time, Bage, Mertz and Hurley should go up to Aladdin's Cave in search of them.

They made a great effort to get away next morning. The sledge was hauled for one thousand one hundred yards up to the magnetic ice-cave against a bitter torrent of air rushing by at eighty-two miles an hour. Here they retreated exhausted.

On the 17th the wind was gauged at eighty-four miles an hour, and nothing could be done. Dense drift and ferocious wind continued until the morning of August 21, and still none of the dogs had come home.

Bage, Hurley and Mertz took advantage of a slight lull to start off at 6.30 A.M. As they did not return that night we presumed they were making good headway.

The drift was thick and the wind high for four days, and it was not until the morning of the 25th that the weather showed clearer and more promising. At 2 P.M. Bage and his companions arrived at the Hut bringing all the dogs except Grandmother, who had died of exhaustion. Aladdin's Cave had been difficult to find in the driving snow, which had thickened after the first few miles. They actually passed close to it when Mertz, between the gusts, sighted Castor jumping about, fully alive to the approaching relief. The other dogs were found curled up in the snow, in a listless, apathetic state; apparently in the same positions when left seven days before. They had made no attempt to break into several bags of provisions lying close at hand, preferring to starve rather than expose their faces to the pelting drift. All were frozen down except Basilisk and Castor. Pavlova was in the best condition, possibly because her last meal had been an extra full one; a reward for remaining with us when the others had bolted. Grandmother was in the worst condition, and, despite all efforts at revival, died four hours after. As the poor brutes were very weak after their long fast and exposure, they were taken into the Cave and fed on warm hoosh. Everything

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possible was done for them, and in return the party passed a very miserable time cramped in such a small space with six dogs. The accommodation was slightly increased by enlarging the Cave.

Five days of calm weather! It could scarcely be credited, yet September came with such a spell. They gave us great opportunities, and, for once, a vision of what perfect Antarctic days might be. The sea speedily froze over and extended our territory to the north. Every day we dredged among the tide-cracks, until Hunter and Laseron had material enough to sort and bottle for weeks. Seals came up everywhere, and the dogs gorged on much-needed meat and blubber. Three large Weddells were shot near the "Eastern Barrier" on September 1, and hauled up an ice-cliff eighty feet high to the rocks above. Work on the wireless masts went on apace, and the geologist was abroad with his plane-table every day. Webb and Bage, after a protracted interval, were able to take star observations for time, in order to check the chronometers.

Mertz, Ninnis, Whetter and Laseron, with a team of dogs sledged a big load of food-stuffs to Aladdin's Cave on September 1. At the Cave the dogs were let loose, but instead of running back to the Hut, lingered about and finally had to be led down the slope. On being loosed again, several rushed back to the Cave and were only brought along by force. That night, Scott and Franklin, two kindred spirits, were not present at "roll-call."

On September 3, McLean, Whetter and Close took more provisions to Aladdin's Cave. They reported light drift and wind on the highlands, while at sea-level it was clear and calm.

The sea-ice was by then thick and safe. About half a mile off shore a very successful dredging was made in fifty fathoms; the bottom at this depth simply teemed with life. At first, the dredge, rope-coils, tub, picks and other necessary implements were dragged about on a sledge, but the sledge was

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hauled only with great difficulty and much exertion over the sticky, new sea-ice. As a substitute a portable, steel hand-cart was advantageously employed, although, owing to its weight, tide-cracks and rotten areas had to be crossed at a run. On one occasion a flimsy surface collapsed under it, and Hunter had a wetting before it was hauled on to firmer ice.

On September 4 there was a cloud radiant from the north-west, indicative of a change in the weather. Ninnis, Mertz and Murphy transported more food-bags and kerosene to Aladdin's Cave. They found Franklin one and a half miles south of the Hut lying on the ice quite well, but there was no sign of Scott. Both dogs were seen on the 1st of the month, when they were in a locality south-east of the Hut, where crevasses were numerous. It seemed most probable that Scott had lost his life in one of them. The party visiting the Cave reported a considerable amount of snow drifting above a level of one thousand feet.

There was another day of successful dredging, and, about four o'clock, while several men were still out on the ice, whirlies with great columns of drift came steadily down the glacier, pouring over the seaward cliffs. In a few minutes the snow-clouds were round the Hut and the wind was not long in working up to eighty miles per hour. The dredging party reached the land just in time; and the sea-ice drifted away to the north. Thus ended one of the most remarkable periods of fine weather experienced by us in Adelie Land, only to be excelled in the height of summer.

The possibility of such a spell being repeated fired us with the hope that after all a reasonable amount of sledging could be accomplished in the spring. Three parties were chosen to reconnoitre in different directions and to test the sledging gear. As we were far from being confident in the weather, I made it clear that no party should penetrate farther than fifty miles from the Hut, nor remain away longer than a fortnight.

Webb, McLean and Stillwell, the southern reconnoitring party, were the first to set off, leaving on September 7 against

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a wind of fifty-six miles per hour. Between them they had only one pair of good spiked crampons, and it was a hard, five hours' drag up to Aladdin's Cave. A tent which had been spread over the entrance to keep out snow was picked up here. It had suffered punctures and small tears from crampons, and, as the next day was one of boisterous wind, the party spent it repairing the tent and endeavouring to take magnetic observations. The latter had to be abandoned owing to the instrument becoming iced up.

Next afternoon the wind fell to the forties, and the party struggled on to the south for three miles two hundred yards and camped, as it was necessary to make a search for a small depot of pemmican tins, a pick and a shovel left by us in the vicinity in August. The drift cleared at noon on the 11th, and the bamboo pole marking the depot appeared a quarter of a mile away on the right. The pick, shovel and flag were secured and another afternoon's march against a fifty-mile wind with a temperature at -20° F. brought the party three and a quarter miles further, to a point eleven and three-quarter miles south of the Hut. The wind rose to the eighties during the night, and there were many small holes in the tent which provided more ventilation than was agreeable. As the wind was too strong for travelling on the 12th, it was decided to make a cave in case of accident to the tent.

A tunnel was driven into the sloping surface of the ice towards a crevasse about a foot wide. It was a good ten hours' job in tough ice before the crevasse was reached. Into the fissure all the hewn ice was thrown instead of being laboriously shovelled up through the tunnel. The "Cathedral Grotto" was soon finished, the tent was struck and the party made themselves comfortable inside. The cavern was found to be a very draughty place with a crevasse along one wall, and it was difficult to keep warm in one-man sleeping-bags. The crevasse was accordingly closed with ice and snow. That evening and on several subsequent occasions McLean took blood-pressure observations.

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During the next three days the wind was so strong that Webb's were the only crampons in which any efficient marching could be done. The time was spent in building a high break-wind of ice-blocks, a pit being excavated on the windward side in which Webb took a full set of magnetic observations. Within the "Grotto" the instrument rapidly became coated with ice-crystals; in the open air this difficulty did not arise, but others had to be overcome. It was exceedingly cold work at -20° F. in a sixty-mile wind, both for Webb and his recorder Stillwell.

There seemed no hope of going forward, so the depot flag was hoisted and a fortnight's provisions and kerosene stowed in the lee of the break-wind. It was a furious race back to the Hut *via* Aladdin's Cave with a gusty, seventy-five-mile wind in the rear. McLean and Stillwell actually skied along on their short blunt crampons, while Webb did his best to brake behind.

The second party comprised Ninnis, Mertz, and Murphy, who went to the south-east, leaving on September 11. After a hard fight to Aladdin's Cave, the wind approaching fifty miles an hour, they diverged to the south-east. On the 12th they made steady progress up the slope of the glacier, delayed by many small crevasses. The surface was so rough that the nuts on the sledge-meter soon became loose and it was necessary to stop every quarter of a mile to adjust them. The day's march was a solid five and three quarter miles against a fifty-mile wind.

On the 13th Ninnis's record proceeds as follows :

"The sky was still clear but the wind had increased to sixty-five miles per hour, the temperature standing at -17° F.

"We kept on the same course; the glacier's slope being steeper. Mertz was as usual wearing leather boots and mountaineering crampons, otherwise progress would have been practically impossible; the finnesko crampons worn by Murphy and myself giving very little foothold. Travelling was very slow indeed, and when we camped at 4 P.M., two and a half miles was all that had been covered.





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“At 9.15 A.M. (September 14) the wind practically dropped, and we advanced under perfect conditions.”

They had not gone far, however, before the wind suddenly increased so that only about four and a half miles were completed in the day. That evening, curiously enough, it fell calm for a time; then there was a period of alternating violent winds and calm.

On Sunday, September 15, it was impossible for them to move, as a hurricane raged outside. The tent was very much damaged by the wind, but in that state it managed to stand up till next morning. In the meantime all three fully dressed themselves and lay in their three-man sleeping-bag ready to take to the road at a moment's notice.

The next morning, at a distance of eighteen miles southeast of the Hut, there was nothing for it but to make for Aladdin's Cave, which was safely reached by a forced march of twelve and three-quarter miles, with a furious wind partly abeam. On the way the sledge was blown sideways on to the lids of many wide crevasses, which, fortunately for the party, were strong at that season of the year.

From the realistic reports of the two parties which had returned it was evident that Madigan and his companions, Close and Whetter, who had set out on the 12th to the west were having a bad time. But it was not till the 23rd, after a week of clear skies, low temperatures and unceasing drift-free wind that we began to feel apprehensive about them.

September 24 and 25 were punctuated by several intervals of calm during which it was judged the party would have been able to travel.

On the morning of September 26 Ninnis and Mertz, with a team of dogs, set off up the hill to Aladdin's Cave to deposit some provisions and to scan the horizon for any sign of the sledgers. On the way they fell in with them descending the slopes, very worn and frost-bitten.

They had a thrilling story to tell, and, when it was known that the party had reached fifty miles to the west, everybody crowded round to listen.

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The wind average at the Hut during their fortnight of absence was fifty-eight miles per hour, implying worse conditions on the plateau. Madigan gave the facts :

“ After leaving Aladdin’s Cave on the 12th we continued due south, lunching at 2 P.M. on the site of Webb’s first camp. Our troubles had already begun ; the wind averaging sixty miles an hour all day with a temperature at noon of -14° F.

“ As a few tears appeared in the tent during the night, we saw that it would not be advisable to put it up next day for lunch, so we had a cold meal, crouched in the lee of the sledge. This custom was found to economize time, as we became so cold eating our fare of biscuit, chocolate and butter that we got moving again as soon as possible. The great disadvantage was that there was nothing to drink between the morning and evening meals.

“ We sewed up the rents in the tent during the halt, having to use bare fingers in the open. About four stitches at a time were as much as one man could manage, and then the other two took their turns.

“ The next day was the only comparatively calm period of the two weeks of travelling. The wind was in the vicinity of thirty miles per hour, and, going west, we reached a spot, twenty miles ‘ out,’ on a snow-covered surface, by nightfall.

“ A steady seventy-five-mile wind blew all day on the 15th at right angles to our course, accompanied by a thick, low drift. The surface was partially consolidated snow, very hard and smooth. Sometimes the sledge would grip and we could pull straight ahead. Then, suddenly, it would slide away sideways down wind and often pull us off our feet with a sudden vicious jerk. Most of the time we were dragging in a south-westerly direction to make the sledge run west, stumbling through the drift with the sledge now behind us, now sliding away to leeward, often capsizing and requiring to be laboriously righted and sometimes repacked.

“ After many experiments, we found the best device was to have two men on the bow-rope, about twenty feet long,

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and one with about ten feet of rope attached to the rear of the sledge. The man on the tail-rope, usually Whetter, found it very difficult to keep his feet, and, after a score of falls in stinging drift with incidental frost-bites on fingers and cheeks, he did not feel exactly cheerful.

“By 4 P.M. on the 15th we had reached twenty-five miles and were exhausted. We pitched camp at an early hour, partly influenced by the fact that it was a special occasion—Close’s birthday! Some port wine had been slipped in to provide against that ‘emergency.’ On taking the precious bottle from the instrument-box, I found that the cork was out, and, for one awful moment, thought the bottle was empty. Then I realized that the wine had frozen solid and had pushed the cork out by its expansion on solidification.

“At last, the tent safely pitched and hoosh and cocoa finished, the moment came to drink to Close’s health and happiness. The bottle had stood on the top of the cooker while the meal was being prepared, but the wine was still as solid as ever. After being shaken and held over the primus for a good half-hour it began to issue in lumps. Once the lumps were secured in mugs the rest of the thawing was easy. Finally, we toasted Close and his wife (in far Australia) in what we voted to be the finest draught it had ever been our good fortune to drink. In the morning a cairn was made of the snow-blocks which were taken from the tent-skirt, and it was surmounted with the bottle, being called ‘Birthday Camp.’

“During September 16 my right eyelid became frost-bitten. I noticed that it was hard and refused to shut, so I rubbed vigorously to bring it round. However, it swelled and blistered badly and the eye remained closed for two days.

“From twenty to fifty miles ‘out’, the surface was névé with areas of sastrugi up to three feet in height. No crevasses were noticed. At twenty-eight miles out, we lost sight of the sea, and at forty miles an altitude of four thousand five hundred feet was reached.

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“ We turned out at 6 A.M. every morning and were on the move by 9 A.M. Lunch only took half an hour and was a most uncomfortable meal. As we sat in the lee of the sledge, the surface-drift swirled up in our faces like fine sand. We never camped before 6 P.M. and were obliged to consider five miles a good day's run.

“ Pitching camp took nearly an hour. Blocks of snow were cut and arranged in a semicircle, within which the tent was laid with its peak upwind. It sounds simple enough, but, as we had to take off crampons so as not to tread on the tent, our difficulties were enormously increased by having to move about wearing finnesko on a smooth surface in a high wind. One man crawled into the tent, and, at a given signal, the other two raised the peak while the former held on to the upwind leg and kicked the other legs into place with his feet. The others then quickly piled food-tanks and blocks of snow on to the skirt, calling out as soon as there was enough to hold it down, as the man gripping the bamboo leg inside would soon have ‘deadly cold’ fingers. It was always a great relief when the tent was up.

“ Almost every night there was some sewing to do, and it was not long before every one's fingers were in a bad state. They became, especially near the tips, as hard as wood and devoid of sensation. Manipulating toggles and buttons on one's clothing gave an immense amount of trouble, and it always seemed an interminable time before we got away in the morning. Our lowest temperature was -35° F., early on September 18.

“ We were fifty miles ‘out’ on September 19 on a white, featureless plain. Through low drift we had seen very little of our surroundings on the march. A bamboo pole with a black flag was raised, a mound was built, and a week's provisions for three men and two gallons of kerosene were cached.

“ In the morning there was a howling eighty-mile blizzard with dense drift, and our hopes of an early start homeward were dispelled. We feared for the safety of the tent, knowing

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that if it had gone during that 'blow' our hopes of getting back to the Hut would have been small.

"The wind continued all day and the next night, but, to our joy, abated on the 21st to fifty miles an hour, permitting us to travel.

"Through a seventy-five-miler on the 22nd and a quieter day on the 23rd, we picked up our half-way mound at Birthday Camp on September 24. On the same night the long-suffering sledge-meter, much battered, gave up recording.

"At 3 A.M. I was awakened by something striking me on the head. I looked out of the sleeping-bag and found that the tent had fallen in on us. The lashing at the apex had carried away and the poles upwind were almost flat. The cap was gone, and one side of the tent was split from top to bottom. I awakened the others, and Whetter and I got out, leaving Close inside to hang on to the bag. Luckily we had kept on our burberrys in case of accidents. For once the entrance had not to be unfastened, as there was a ready-made exit. The poles were roughly bound together with an alpine rope and anchored to a pick on the windward side. It was blowing about eighty miles an hour, but fortunately there was no drift. When daylight came the tent was found to be hopelessly ruined, and to light the primus was impossible, though the wind had abated to thirty-five miles an hour.

"We ate some frozen food and pushed on, hoping to find Aladdin's Cave before dark, so that we should not have to spend a night without a tent. After a struggle of thirteen miles over rough ice we came, footsore and worn out, to Aladdin's Cave. Close's feet were badly blistered, and both my big toes had become frost-bitten at the fifty-mile camp, giving me a good deal of trouble on the way back.

"Never was the Cave a more luxurious place. The cooker was kept busy far into the night, while we drank and smoked and felt happy."

The successful conclusion of this journey in the face of

THE HOME OF THE BLIZZARD

the most adverse weather conditions was something upon which Madigan, Whetter and Close could well feel proud, for in its way it must be a record in the sledging world. They were indeed badly frost-bitten; Madigan's great toes having suffered most of all. Whetter's chief injury was a wound under the chin occasioned by a pair of scissors handled by Madigan to free Whetter's helmet on an occasion when it was firmly frozen to his face.

On October 1, Mertz, Hurley and Ninnis made a gallant attempt to rescue two dogs, Basilisk and Franklin, which had remained at Aladdin's Cave on September 26, after accompanying them there with a load of provisions. At the Hut there was no drift, but during the ascent it became thicker, and the wind stronger, forcing them at last to turn back.

Two days later another attempt was made by Ninnis and Mertz, and, in dense drift, after wandering about for a long time they happened on the Cave, to find that the dogs were not there, though spots were discovered where they had evidently been sleeping in the snow. Coming back disconsolately, they found that the dogs had reached the Hut not long before them. Apparently the two vagrants, hearing Ninnis and Mertz blundering about in the drift in search of the depot, had decided that it was time to return home. We concluded that the ways of these Greenland dogs were past finding out.

October came with a deluge of snow and transient hours of bright sunlight, during which the seals would make a temporary landing and retire again to the water when their endurance was exhausted. Snow petrels flew in great numbers about the rocks in the evening, seeking out their old nest-crevices. Seeing these signs of returning life, every one was in great expectation of the arrival of the penguins.

On the night of the 11th, Hurley, Laseron, Hunter and Correll made an innovation by presenting a small farce to an audience which had been starved of dramatic entertainment for a long time, and consequently showed tremendous appreciation.



Adelie Land

SNOW PETRELS PREPARING TO NEST, CAPE DENISON

Hurley



Adelie Land

A SNOW PETREL ON THE NEST

Hurley



Adelie Land

Hurley

ADELIE PENGUINS DIVING INTO THE SEA IN QUEST OF FOOD



Adelie Land

Hurley

ADELIE PENGUINS JUMPING ON TO THE FLOE

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The first penguin came waddling up the ice-foot against a seventy-mile wind late on the afternoon of October 12. McLean brought the bird back to the Hut and the newcomer received a great ovation. Stimulated by their success on the previous night and the appearance of the first penguin, the theatrical company added to their number, and, dispensing with a rehearsal, produced an opera, "The Washerwoman's Secret" (Laseron). Part of the Hut was curtained off as a combined green-room and dressing-room; the kitchen was the stage; footlights twinkled on the floor; the acetylene limelight beamed down from the rafters, while the audience crowded on a form behind the dining-table, making tactless remarks and steadily eating chocolate.

The typed programmes advertised the following :

THE WASHERWOMAN'S SECRET

(Opera in Five Acts)

DRAMATIS PERSONÆ

DR. STAKANHOISER (Tenor)	" Hoyle "	Hurley
CHEVALIER DE TINTAIL (Fiver)	" Johnny "	Hunter
BARON DE BRENT (Basso)	" Joe "	Laseron
COUNT HOOPENKOFF (Barrowtone)	" Little Willie "	Correll
MADAM FUCLOSE (Don't Sing)	" Also Joe "	Laseron
JEMIMA FUCLOSE (Soprano)	" Dad "	McLean
DR. STAKANHOISER'S DOG	" Monkey "	Greenland Pup
VILLAGE IDIOT	" Bick "	Bickerton
ORCHESTRA	" Stillwater Willie "	Stillwell

ACT I

SCENE : *Room in poorer part of Berlin : MADAM FUCLOSE in bed dying : JEMIMA at table washing clothes*

Song " When Sparrows Build " JEMIMA
[Knock at door. Enter DR. STAKANHOISER.]

Song : " I vas a Doctor " " I vas a Doctor "
[Attends MADAM FUCLOSE, who, when dying, tells him that JEMIMA is not her daughter, but the Princess of Adelianna, whom she has rescued in Paris during the Revolution.]

Death Scene and Chorus : " Who Killed my Mother ? "

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ACT II

SCENE : *Beneath JEMIMA'S window*

[*Enter Dr. STAKANHOISER disguised as organ grinder.*

Song : " Vurds der Likum " Dr. S.

[*JEMIMA opens window and throws flour on DOCTOR.*

[*Enter BARON DE BRENT, kicks DOCTOR out.*

Song : " Baron of Brent "

[*BARON makes love to JEMIMA, who laughs at him.*

Duet : " Wilt love me " JEMIMA and BARON

[*Enter CHEVALIER DE TINTAIL, who denounces the BARON as already having four wives. The BARON goes off, muttering revenge.*

Song : " I'm in love with a wonderful lady " CHEVALIER

[*The CHEVALIER makes love to JEMIMA, who loves him in return.*

Chorus : " Jemima "

ACT III

SCENE : *Conspirators' Chamber*

[*Enter DOCTOR, who hides behind a barrel.*

[*Enter COUNT HOOPENKOFF, who amuses himself playing a piccolo.*

[*Enter BARON. They discuss plot to kidnap Princess, which is overheard by DOCTOR.*

[*Enter Ghost, who frightens conspirators away.*

Chorus : " Little Willie Smith "

ACT IV

SCENE : *JEMIMA'S room*

[*The CHEVALIER DE TINTAIL is waiting.*

Song : " I want you to see my Girl " CHEVALIER

[*Enter JEMIMA. Love scene.*

[*Enter DOCTOR, who discloses the plot he has heard and tells JEMIMA of her high descent. The CHEVALIER and the DOCTOR hide, and the two villains, by means of a ladder, enter the room. The heroes spring from their hiding-place and the villains are ejected.*

Chorus : " There is a Wash-House "

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ACT V

SCENE : *Conspirators' Chamber*

[*The BARON and COUNT enter by different doors. They accuse each other of having betrayed the plot. Duel follows in which both are killed.*

Duet : "Mort de Botheo" COUNT and BARON

[*All the others rush in. The two lovers come together and the DOCTOR says, "God bless you, my children."*

Chorus : "Auld Lang Syne" COMPANY and AUDIENCE
And

GOD SAVE THE KING

Played by the Society for the Prevention of the Blues.

Saturday, October 12, 1912.

ADELIE HALL.

Admission Free.

Children Half Price.

October 13 was known as Black Sunday. We were all seated at dinner and the Hut was quivering in the tornado-like gusts which followed a heavy "blow" reaching a maximum hourly average of ninety-one miles. One mighty blast was followed by a crack and the sound of a heavy falling body. For a moment it was thought that something had happened to the Hut. Then the messman ran out to the trap-door and saw that the northern wireless mast had disappeared.

The weather showed but meagre signs of improvement, but the penguins came up in great numbers. They were in groups all along the ice-foot in the lee of rocks and icy pinnacles. They climbed up to their old resorts, and in a few days commenced to build nests of small pebbles. Skua gulls mysteriously appeared, snow petrels hovered along the rocky ridges and odd seals landed on the wind-raked harbour ice. Silver-grey and Antarctic petrels flew along the shore with occasional Cape pigeons. If the weather were indifferent to the fact, the birds did not forget that spring had come.

A Weddell seal calved on the bay-ice on October 18. For a week the pup had a miserable time in winds ranging mostly

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about the seventies, with the temperature below zero Fahrenheit. At last it became so weak that it thawed a hole in the soft, sludgy ice and could not extricate itself. Both it and the mother were killed and skinned for the biological collection.

On all but the worst days a gang of men worked with picks and shovels digging out the Hangar, so that Bickerton could test the air-tractor sledge. The attack was concentrated upon a solid bank of snow and ice into which heaps of tins and rubbish had been compactly frozen. In soft snow enormous headway can be made in a short space of time, but in that species of conglomerate, progress is slow. Eventually, a cutting was made by which the machine could pass out. The rampart of snow was broken through at the northern end of the Hangar, and the sledge with its long curved runners was hauled forth triumphantly on the 25th. From that time onwards Bickerton continued to experiment and to improve the contrivance.

On October 21 there was a marked thaw inside the Hut. The frost along all the cracks dissolved into water and ran down the walls over pictures, on to book-shelves and bunks. The thick caking of ice on the windows dripped continually, coming away in layers at lunch-time and scattering among the diners at both ends of the table. Every available bucket and tub was in use, and small tin-gutters hooked under each window had to be emptied at frequent intervals.

Stillwell came in during the afternoon bearing an albino penguin with a prettily mottled head; a curious freak of which the biologists immediately took possession. The penguins now swarmed along the foreshores, those not settling down in the rookeries wandering about in small crowds, occasionally visiting the Hut and exploring among the rocks or up the slippery glacier. Murphy was heard, at this time, to advance a theory accounting for the fact that Adelie penguins never made their nests on a scale more elaborate than a collection of stones. He submitted that anything else would be blown away. To support the contention, he stated that as soon

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as the female lays her egg, she places a stone on top to weight it down. The biologists kept a dignified silence during the discussion.

On the 21st an Emperor penguin landed on the harbour-ice, and, early in November, two more were captured. These imperial birds are very rare on the coasts of Adelie Land, owing to the fact that their winter breeding-grounds in Antarctica are selected in spots where climatic conditions are comparatively good.

October closed with an average wind velocity of 56.9 miles per hour. Yet the possibility of summer sledging was no longer remote. The sun was high, spells of calm were longer and more frequent, and, with the certain knowledge that we should be on the plateau in November, the sledging parties were chosen, schemes of exploration were discussed, and the last details for an extensive campaign completed.

CHAPTER XII

ACROSS KING GEORGE V LAND

We yearned beyond the skyline.—KIPLING

OCTOBER had passed without offering any opportunities for sledging, and we resolved that in defiance of all but the worst weather a start would be made in November. The *Aurora* was due to arrive early in January 1913 and the time at our disposal for exploration was slipping away rapidly.

The investigation by sledging journeys of the coastline to the eastward was regarded as of prime importance, for our experience in the *Aurora* when in those longitudes during the previous year was such as to give little promise of its ever being accomplished from the sea.

Westward, the coast was accessible from the sea; at least for some distance in that direction. Madigan's journey in the springtime had demonstrated that, if anything, the land to the west was steeper, and consequently more windy conditions might be expected there. Further, it was judged that information concerning this region would be forthcoming from the ship, which had cruised westward after leaving Adelie Land in January 1912. The field in that direction was therefore not so promising as that to the east.

On this account the air-tractor sledge, of somewhat doubtful utility, was detailed for use to the westward of Winter Quarters, and, as it was obvious that the engine could only be operated in moderately good weather, its final departure was postponed until December.



Adelie Land

MERTZ IN AN ICY RAVINE

Hurley



MERTZ AND NIXNIS ARRIVE WITH THE DOGS AT ALADDIN'S CAVE

ACROSS KING GEORGE V LAND

The following is a list of the parties which had been arranged and which, now fully equipped, were on the tiptoe of expectation to depart.

(1) A Southern Party composed of Bage (leader), Webb and Hurley. The special feature of their work was to be magnetic observations in the vicinity of the South Magnetic Pole.

(2) A Southern Supporting Party, including Murphy (leader), Hunter and Laseron, who were to accompany the Southern Party as far as possible, returning to Winter Quarters by the end of November.

(3) A Western Party of three men—Bickerton (leader), Hodgeman and Whetter—who were to traverse the coastal highlands west of the Hut. Their intention was to make use of the air-tractor sledge and the departure of the party was fixed for early December.

(4) Stillwell, in charge of a Near Eastern Party, was to map the coastline between Cape Denison and the Mertz Glacier-Tongue, dividing the work into two stages. In the first instance, Close and Hodgeman were to assist him; all three acting partly as supports to the other eastern parties working further afield. After returning to the Hut at the end of November for a further supply of stores, he was to set out again with Close and Laseron in order to complete the work.

(5) An Eastern Coastal Party composed of Madigan (leader), McLean and Correll was to start in early November with the object of investigating the coastline beyond the Mertz Glacier.

(6) Finally, a Far-Eastern Party, assisted by the dogs, was to push out rapidly overland to the southward of Madigan's party, mapping more distant sections of the coastline, beyond the limit to which the latter party would be likely to reach.

As the plans for the execution of such a journey had of necessity to be more provisional than in the case of the others, I determined to undertake it, accompanied by

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Ninnis and Mertz, both of whom had so ably acquitted themselves throughout the Expedition and, moreover, had always been in charge of the dogs.

November opened with more moderate weather, auguring still better conditions for midsummer. Accordingly November 6 was fixed as the date of final departure for several of the parties. The evening of November 5 was made a special occasion: a farewell dinner, into which everybody entered very heartily.

On the morning of the 6th, however, we found a strong blizzard raging and the landscape blotted out by drift-snow, which did not clear until the afternoon of the following day.

At the first opportunity, Murphy, Hunter and Laseron (supporting the Southern Party) got away, but found the wind so strong at a level of one thousand feet on the glacier that they anchored their sledge and returned to the Hut for the night.

The next morning saw them off finally and, later in the day, the Near-Eastern Party (Stillwell, Close and Hodgeman) and the Eastern Coastal Party (Madigan, McLean and Correll) got under way, though there was still considerable wind.

My own party was to leave on the 9th for, assisted by the dogs, we could easily catch up to the other eastern parties, and it was our intention not to part company with them until all were some distance out on the road together.

The wind increased on the 9th and the air became charged with drift, so we felt sure that those who preceded us would still be camped at Aladdin's Cave, and that the best course was to wait.

At this date the penguin rookeries were full of new-laid eggs, and the popular taste inclined towards omelettes, in the production of which Mertz was a past master. I can recall the clamouring throng who pressed round for the final omelette as Mertz officiated at the stove just before we left on the 10th.

ACROSS KING GEORGE V LAND

It was a beautiful calm afternoon as the sledge mounted up the long icy slopes. The Southern Party (Bage, Webb and Hurley) were a short distance in advance, but by the help of the dogs we were soon abreast of them. Then Bickerton, who had given Bage's party a pull as far as the three-mile post, bade us good-bye and returned to the Hut where he was to remain in charge with Whetter and Hannam until the return of Murphy's party.

At Aladdin's Cave, while some prepared supper, others selected tanks of food from the depot and packed the sledges. After the meal, the Southern Party bade us farewell and set off at a rapid rate, intending to overhaul their supporting party on the same evening at the Cathedral Grotto, eleven and three-quarter miles from the Hut. Many finishing touches had to be put to our three sledges and two teams of dogs, so that the departure was delayed till next morning.

We were up betimes and a good start was made before anything came of the overcast sky which had formed during the night. The rendezvous appointed for meeting the others, in case we had not previously caught them up, was eighteen miles south-east of Aladdin's Cave. But, with a view to avoiding crevasses as much as possible, a southerly course was followed for several miles, after which it was directed well to the east. In the meantime the wind had arisen and snow commenced to fall soon after noon. In such weather it was impossible to locate the other parties, so a halt was made and the tent pitched after eight miles.

Five days of wind and drift followed, and for the next two days we remained in camp. Then, on the afternoon of the 13th, the drift became less dense, enabling us to move forward on an approximate course to what was judged to be the vicinity of the rendezvous, where we camped again for three days.

Comfortably ensconced in the sleeping-bags, we ate only a small ration of food; the savings being carefully put away for a future "rainy day." Outside, the dogs had at first an unpleasant time until they were buried in snow

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which sheltered them from the stinging wind. Ninnis and Mertz took turns day by day attending to their needs.

The monotony and disappointment of delay were just becoming acute when the wind fell off, and the afternoon of November 16 turned out gloriously fine.

Several excursions were immediately made in the neighbourhood to seek for the whereabouts of the other parties, but all were unsuccessful. At length it occurred to us that something serious might have happened, so we left our loads and started back at a gallop for Aladdin's Cave with two empty sledges, Mertz careering ahead on skis over the sastrugi field.

Shortly afterwards two black specks were seen away in the north; a glance with the binoculars leaving no doubt as to the identity of the parties. We returned to the loads, and, having picked them up, made a course to the east to intercept the other men.

It was a happy camp that evening with the three tents pitched together, while we compared our experiences of the previous six days and made plans for the outward journey.

Our sledge-meter had already suffered through bumping over rough ice and sastrugi, and an exchange was made with the stronger one on Stillwell's sledge. A quantity of food was also taken over from him and the loads were finally adjusted.

The details and weights of the equipment on the three sledges belonging to my party are sufficiently interesting to be set out at length below. Most of the items were included in the impedimenta of all our parties, but slight variations were necessary to meet particular circumstances or to satisfy the whim of an individual.

TOTAL LOAD

The Principal Sledge, 11 ft. long, 45 lb.

Fittings for Same: Instrument-box, 7 l. 5 oz.; cooker-box, 7 l. 6 oz.; kerosene-tray, 3 lb.; mast-attachment,

ACROSS KING GEORGE V LAND

2 lb. 8 oz. ; mast, 1 lb. 15 oz. ; spar, 1 lb. 8 oz. ; decking (canvas and bamboo), 3 lb. 5 oz. ; rigging, 7·5 oz. ; 5 leather straps, 5 lb.	lb. oz. 77 6·5
<i>Drill Tent</i> , strengthened and attached to poles, also floor-cloth, 33 lb. Spare drill cover, 11 lb. 8 oz.	44 8
<i>Sleeping-bags</i> , 3 one-man bags	30 0
<i>Cooking Gear</i> : Nansen cooker, 11 lb. 3 oz. ; 3 mugs, 1 lb. 8 oz. , 2 tins, 10 oz. ; scales, 5 oz. ; 3 spoons, 1·5 oz. ; matches, 13·5 oz., and damp-proof tin to hold same, 3·7 oz. ; "Primus" heater, full, 3 lb. 10 oz. ; "Primus" prickers, 2·5 oz. ; "Primus" repair outfit, 2 oz. ; kerosene tin openers and pourers, 4·5 oz. ; spirit for "Primus" in tin, 5 lb. 14 oz., also a ready bottle, full, 1 lb. 5 oz.	25 14·2
<i>Repair Outfit</i> : Spare copper wire, rivets, needles, thread, etc., 1 lb. 14·5 oz. ; set of 12 tools, 15·5 oz. ; requirements for repairing dog-harness and medically treating the dogs, 3 lb. 8 oz.	6 6
<i>Medical Outfit</i> : 6 "Burroughs & Wellcome" first field dressings ; absorbent cotton wool ; boric wool ; pleated lint ; pleated bandages, roll bandages ; adhesive tape ; liquid collodion ; "tabloid" ophthalmic drugs for treating snow-blindness ; an assortment of "tabloid" drugs for general treatment ; canvas case containing scissors, forceps, artery-forceps, scalpel, surgical needles and silk, etc.	2 12·3
<i>Photographic Outfit</i> : A $\frac{1}{4}$ -plate, long, extension-camera in a case, with special stiffening board and 36 cut films, 4 lb. 4·5 oz. ; adaptor to accommodate camera to theodolite legs, 2 oz. ; a water-tight tin with 14 packets, each containing 12 cut films, 3 lb. 10 oz.	8 0·5
<i>Surveying Requirements</i> : A 3" transit theodolite in case, 5 lb. 14 oz. ; legs for the same, 3 lb. 6 oz. ; sledge-meter, 8 lb. ; Tables from Nautical Almanack and book of Logarithmic Tables, 1 lb. 3 oz. ; 2 note books, 1 lb. 6 oz. ; angle-books, 5 oz. ; map-tube, 10 oz. ; maps, 6·5 oz. ; pencils, 1·5 oz. ; dividers and rubber, 1·5 oz. ; protractor and set-square, 5 oz. ; prismatic compass and clinometer, 8·5 oz. ; sun-compass (Bage's), 1·5 oz.	22 0
<i>Other Instruments</i> : Zeiss prismatic binoculars X.12, 1 lb. 13·5 oz. ; hypsometer, 2 lb. 1 oz. ; 2 ordinary and 2 small minimum thermometers, 10 oz. ; specimen labels, 1 oz.	4 9·5
<i>Rifle</i> , 22-bore with cover and cleaner, 3 lb. 3·7 oz. ; ammunition, 1 lb. 5 oz. ; sheath knife, 5·5 oz. ; sharpening stone, 1·5 oz. ; fishing line and hooks, 3·5 oz.	4 14·7
<i>Waterproof Clothes-bag</i> , 4 lb. 8 oz., containing 9 pairs of finnesko stuffed with saennegrass, 21 lb. ; extra saennegrass, 3 lb. ; 3 private kit-bags containing spare clothing, etc., 39 lb. ; 4 extra rolls of lamp-wick for lashings, 1 lb. 3·5 oz.	64 3·5

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<i>Odd Gear</i> : Pick, 4 lb. 5 oz. ; 2 spades, 8 lb. 4 oz. ; ice-axe, 2 lb. 4 oz. ; alpine rope (20 metres) 3 lb. ; skis (1 pair), 11 lb. ; ski-stick, 1 lb. 1 oz. ; ski-boots (2 pairs), 6 lb. ; attachable crampons for the same, 4 lb. ; finnesko-crampons (3 pairs), 9 lb. ; 3 man-harnesses, 6 lb. 8 oz. ; man-hauling tow-rope, 1 lb. 1 oz. ; flags. 9·5 oz. ; a water-proof bag to hold oddments, 4 lb. 8 oz.	lb. oz. 61 8·5
<i>Beacons</i> : A depot-flag and bamboo pole, 5 lb. ; a special metal depot-beacon, mast, flag and stays, 16 lb. ; 2 damp-proof tins for depositing records at depots, 7·5 oz.	21 7·5
<i>Other Sledges</i> : A second sledge decked with Venesta boarding and fitted with straps	55 0
A third sledge, 12 ft. long and strong rope lashings (spare spars mentioned elsewhere acting as decking)	60 0
<i>Fuel</i> : Kerosene, 6 gallons in one-gallon tins	60 0
<i>Food</i> : <i>Man Food</i> : 9 weeks' supplies for 3 men on the ration scale ; also 25 lb. weight of special foods-' perks '	475 0
<i>Dog Food</i> : Dried seal meat, blubber and pemmican ; also the weight of the tin and bag-containers	700 0
Total	1723 11·3

Madigan's and Stillwell's parties broke trail to the east on the morning of the 17th while we were still attending to the sledges and dogs preparatory to departure. It was decided that Gadget, a rather miserable animal, who had shown herself useless as a puller thus far, should be killed. The following dogs then remained:—Basilisk, Shackleton, Ginger Bitch, Franklin, John Bull, Mary, Haldane, Pavlova, Fusilier, Jappy, Ginger, George, Johnson, Castor, Betli and Blizzard.

We went in pursuit of the other six men over a surface of rough sastrugi. The dogs, who were in fine fettle, rushed the sledges along, making frantic efforts to catch up to the parties ahead, who showed as black specks across the white undulating plain.

At noon all lunched together, after which we separated, shaking hands warmly all round and interchanging the sledgers' "Good luck!" Our dogs drew away rapidly to the east, travelling on a slight down grade; the other two parties with their man-hauled sledges following in the



MERTZ EMERGING FROM ALADDIN'S CAVE



A TEAM OF DOGS EAGERLY FOLLOWING NIXNIS

Mertz



THE DOGS ENJOY THEIR WORK

Mertz

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same direction. The surface was splendid, the weather conditions were ideal, the pace, if anything, too rapid, for capsize were apt to occur in racing over high sastrugi. Any doubts as to the capability of the dogs to pull the loads were dispelled; in fact, on this and on many subsequent occasions, two of us were able to sit, each one on a sledge, while the third broke trail ahead.

In sledging over wide, monotonous wastes with dogs as the motive power, it is necessary to have a forerunner, that is, somebody to go ahead and point the way, otherwise the dogs will run aimlessly about. Returning over old tracks, they will pull along steadily and keep a course. In Adelie Land we had no opportunity of verifying this, as the continuous winds soon obliterated the impression of the runners.

If the weather is reasonably good and food is ample, sledging dogs enjoy their work. Their desire to pull is doubtless inborn, implanted in a long line of ancestors who have faithfully served the Esquimaux. We found that the dogs were glad to get their harnesses on and to be led away to the sledge. Really, it was often a case of the dog leading the man, for, as soon as its harness was in place, the impatient animal strained to drag whatever might be attached to the other end of the rope. Before attaching a team of dogs to a sledge, it was necessary to anchor the latter firmly, otherwise in their ardour they would make off with it before everything was ready.

There can be no question as to the value of dogs as a means of traction in the Polar regions, except when travelling continuously over very rugged country, over heavily crevassed areas, or during unusually bad weather. It is in such special circumstances that the superiority of man-hauling has been proved. Further, in an enterprise where human life is always at stake, it is only fair to put forward the consideration that the dogs represent a reserve of food in case of extreme emergency.

We continued due eastwards until five o'clock on the

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afternoon of the 17th at an altitude of two thousand six hundred feet. On the crest of a ridge, which bore away in distinct outline, on our left, a fine panorama of coastal scenery was visible. Far off on the eastern horizon the Mertz Glacier Tongue discovered itself in a long wall touched in luminous bands by the south-western sun. A wide valley fell away in front, and beyond it was a deep indentation of the coastline, which would make it necessary for us to follow a more southerly course in order to round its head.

I determined to convey to the other parties my intentions, which had become more defined on seeing this view ; and, in the meantime, we halted and treated ourselves to afternoon tea. This innovation in the ordinary routine was extended to a custom by saving a portion of the lunch ration for a "snack" at 5 P.M. on all days when the weather was moderately good. As latitude sights were required at midday and longitude shots at 5 P.M., the arrangement was very convenient, for, while one of us made tea, the other two took the observations.

About 6 P.M. the two man-hauled sledges came up with us, our plans for the future were reviewed and the final instructions were given. We bade our comrades adieu and, turning to the south-east, descended quickly down a long slope leading into the valley. The sky was overcast and it was almost impossible to see the irregularities of the surface. Only a dull-white glare met the eyes, and the first indication of a hillock was to stub one's toes against it, or of a depression to fall into it. We pulled up the dogs at 7.30 P.M. after covering thirteen and a quarter miles in the day.

At 9.45 A.M. on November 18 everything was ready for a fresh start. The other parties could be seen rapidly bearing down on us under full sail, but our willing teams had soon dragged the three sledges over an eminence and out of their sight.

It was a lovely day ; almost like a dream after the

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lengthy months of harassing blizzards. A venturesome skua gull appeared at lunch time, just as an observation for latitude was being taken. By the time Ninnis had unpacked the rifle the bird had flown away.

The direction of the sastrugi was found to vary from that which obtained farther west, owing to a slight swing in the direction of the prevailing wind. The irregularities in the coastline account for this; the wind tending to flow down to sea-level by the nearest route.

To the north-west, behind us, a projecting ridge of rock—Madigan Nunatak—came into sight. From the camp of the previous evening it had evidently been hidden from view by an undulation in the surface.

During the afternoon it was noted that the surface had become very deeply eroded by the wind, troughs three feet in depth being common, into which the sledges frequently capsized. Each of us took it in turn to run ahead, jumping from one sastruga to another. As these were firm and polished by the constant wind, one often slipped with a sudden shock to the ground. Our bodies were well padded with clothing and we were beginning to get into good form, so that these habitual tumbles were taken with the best grace we could muster. I surprised myself during the afternoon, when my turn came as forerunner, by covering two and a half miles at a jog-trot without a break. The grade was slightly downhill and the sledges moved along of their own accord, accelerated by jerks from the dogs, gliding at right angles to the knife-edge crests of the snow-waves.

The roughness of the surface was not without its effect on the sledge-meter, which had to be repaired temporarily. It was a matter of some inconvenience that after this date its records were erroneous and approximate distances were only obtained by checking the readings against absolute observations made for latitude and longitude.

At 5.30 P.M. a dark object stood in salient relief above the white contour of the snowy sky-line on the right. Sup-

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pressing our excitement, we pressed on eagerly, changing course so as to approach it. At nine o'clock it resolved itself into the summit of an imposing mountain rising up from a mysterious valley. Aurora Peak, as it was named, was to be a prominent landmark for several days to come.

All were ready to be on the move at 8.45 A.M. on November 19. While Mertz and Ninnis built a cairn of snow, I wrote a note to be left on it in a tin, containing instructions to Stillwell in case he should happen on the locality.

The weather was good and the temperatures were high, ranging at this time (one month from midsummer) between zero and 18° F. When we camped for lunch the air was quite calm and the sun's rays were extremely warm.

The surface became softer and smoother as the afternoon lengthened until Mertz was tempted to put on his skis. He then became forerunner for the remainder of the day.

Mertz, who was skilled in the use of skis, found them of great service on this and on many future occasions. At such times he would relieve Ninnis and myself in the van. On the other hand, over deeply furrowed sastrugi or blue ice, or during a strong wind, unless it were at our backs, skiing was impossible.

Owing to a steeper down grade, the sledges were now commencing to run more freely and improvised brakes were tried, all of which were ineffectual in restraining the dogs. The pace became so hot that a small obstacle would capsize the sledge, causing it to roll over and over down the slope. The dogs, frantically pulling in various directions to keep ahead of the load, became hopelessly entangled in their traces and were dragged along unresistingly until the sledge stopped of its own accord or was arrested by one of us. At length, most of the dogs were allowed to run loose, and, with a man holding on behind and a couple of dogs pulling ahead, the loads were piloted down a steep slope for several miles.

The evening camp was situated at the crest of the last



Adelie Land

SPEEDING EAST

Mawson



Adelie Land

A DISTANT VIEW OF AURORA PEAK FROM THE WEST

Mawson

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but steepest fall into a wide glacial valley which was clearly seen to sweep northwards past the eastern side of Aurora Peak. Looking back we could define our track winding down in the bed of a long shallow valley, while, uprising on either hand near the rim of the plateau were crevassed bluffs where the ice of the tableland streamed abruptly over the underlying crags.

Ninnis had a touch of snow-blindness which rapidly improved under treatment. The stock cure for this very irritating and painful affection is to place first of all tiny "tabloids" of zinc sulphate and cocaine hydrochloride under the eyelids where they quickly dissolve in the tears, alleviating the smarting, "gritty" sensation which is usually described by the sufferer. He then bandages the eyes and escapes, if he is lucky, into the darkness of his sleeping-bag.

In certain lights one is sure to be attacked more or less severely, and coloured glasses should be worn continually. Unfortunately, goggles are sometimes impracticable on account of the moisture from the breath covering the glasses with an icy film or driving snow clogging them and obscuring the view. For such contingencies narrow slots of various shapes are cut in plates or discs of wood or bone in the Esquimaux fashion. The amount of light reaching the eye can thus be reduced to the limit of moderately clear vision.

The morning of the 20th broke with wind and drift which persisted until after noon. Already everything had been packed up, but, as there was a steep fall in front and crevasses were not far distant, we decided not to start until the air was clear of snow.

When at last a move was possible, it became evident that the dogs could not be trusted to pull the sledges down to the edge of the glacier. So they were tethered to ice-axes while we lowered the sledges one by one, all three checking their speed, assisted by rope brakes round the runners. Finally, the impatient dogs were brought down and harnessed in their accustomed places.

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Rapid travelling now commenced over a perfectly smooth surface, sloping gently to the bed of the glacier. Mertz shot ahead on skis, and our column of dogs and sledges followed quickly in his trail.

From this day forward our "order of procession" was as follows:—Behind the forerunner came a team of dogs dragging two sledges joined together by a short length of alpine rope. Bringing up the rear were the rest of the dogs dragging the third sledge. Each team pulled approximately equal weights; the front load being divided between two sledges. Except when taking my turn ahead, I looked after the leading team; Ninnis or Mertz, as the case might be, driving the one behind.

We skirted Aurora Peak on its south-eastern side. The mountain rose to a height of about seventeen hundred feet on our left, its steep sides being almost completely snow-clad.

The wide depression of the Mertz Glacier lay ahead, and on its far side the dim outline of uprising icy slopes was visible, though at the time we could not be certain as to their precise nature.

As the sledges passed Aurora Peak, Blizzard and Ginger Bitch ran alongside. The former had hurt one of her fore-feet on the previous day during the "rough-and-tumble" descending into the valley. Ginger Bitch was allowed to go free because she was daily expected to give birth to pups. As she was such a good sledge-dog we could not have afforded to leave her behind at the Hut, and later events proved that the work seemed actually to benefit her, for she was at all times the best puller and the strongest of the pack. However, in permitting both dogs to run loose that afternoon, there was an element of danger which we had not sufficiently appreciated.

Suddenly, without any warning, half of my dogs dropped out of sight, swinging on their harness ropes in a crevasse. Next moment I realized that the sledges were in the centre of a bridge covering a crevasse, twenty-five feet wide,

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along the edge of which part of the team had broken through.

We spent many anxious moments before they were all hauled to the daylight and the sledge rested on solid ground. There were other crevasses about and almost immediately afterwards Ginger Bitch and Blizzard had broken through into a fissure and were frantically struggling to maintain their hold on the edge. They were speedily rescued; following which Ginger Bitch gave birth to the first of a large litter of pups. After this second accident we decided to camp.

During the morning of November 21 there was a good deal of wind and drift which made travelling rather miserable. Occasionally open crevasses would break the surface of the snow.

When the light at last improved, a nunatak was observed some fifteen miles or more to the south rising out of the glacier—Correll Nunatak. Ahead of us was a glittering line of broken ice, stretching at right angles to our path. Studded about on the icy plain were immense cauldrons, like small craters in appearance. Then an area dotted over with ice mounds approached and crevasses became correspondingly more numerous. The dogs frequently broke through them but were easily extricated in every instance.

Camp was pitched for lunch in the vicinity of many gaping holes leading down into darkness, places where the bridges over large crevasses had fallen in. Mertz prepared the lunch and Ninnis and I went to photograph an open crevasse near by. Returning, we diverged on reaching the back of the tent, he passing round on one side and I on the other. The next instant I heard a bang on the ice and, swinging round, could see nothing of my companion but his head and arms. He had broken through the lid of a crevasse fifteen feet wide and was hanging on to its edge close to where the camera lay damaged on the ice. He was soon dragged into safety. Looking down into the

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black depths we realized how narrowly he had escaped. As the tent was found to encroach partly on the same crevasse, it may be imagined that we did not dally long over the meal.

In the afternoon the weather became clear and fine, but, as if to offset this, the broken surface became impassable. The region was one of *sérac* where the glacier was puckered up, folded and crushed. After several repulses in what seemed to be promising directions, we were finally forced to camp, having ten miles to our credit.

Whilst Mertz fed the dogs and prepared hoosh, Ninnis and I roped up and went off to search for a passage.

All around, the glacier was pressed up into great folds, two hundred feet in height and between one quarter and a third of a mile from crest to crest. The ridges of the folds were either domes or open rifts partly choked with snow. Precipitous ice-falls and deep cauldrons were encountered everywhere. To the north the glacier flattened out; to the south it was more rugged.

In this chaos we wandered for some miles until a favourable line of advance had been discovered for the march on the following day.

The first three miles, on the 22nd, were over a piece of very dangerous country, after which our prospects improved and we came to the border of a level plain.

There Mertz slipped on his skis, went ahead and set a good pace. Although the sky had become overcast and snow fell fitfully, our progress was rapid towards the rising slopes of the land on the eastern side of the glacier. Over the last three miles of the day's journey the surface was raised in large, pimply masses surrounded by wide fissures. Into one of the fissures, bridged by snow, Ninnis's sledge fell, but fortunately jammed itself just below the surface. As it was, we had a long job getting it up again, having to unpack the sledge in the crevasse until it was light enough to be easily manipulated. Despite the delay, our day's run was sixteen and a half miles.

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At 8 A.M. on the 23rd everything was in readiness for a fresh start. Moderate drift and wind descended from the hills and there were yet three miles of hidden perils to be passed. With the object of making our advance less dangerous, various devices were employed.

First of all the towing rope of the rear sledge was secured to the back of the preceding sledge. This arrangement had to be abandoned because the dogs of Ninnis's team persisted in entangling themselves and working independently of the dogs in front. Next, all the sledges were joined together with all the dogs pulling in front. The procession was then so long that it was quite unmanageable on account of the tortuous nature of our track through the labyrinth. In the long run, it was decided that our original method was the best, provided that special precautions were taken over the more hazardous crossings.

The usual procedure was, that the forerunner selected the best crossing of a crevasse, testing it with a ski-stick. The dog teams were then brought up to the spot and the forerunner went over the snow-bridge and stood on the other side, sufficiently far away to allow the first team to cross to him and to clear the crevasse. Then the second team was piloted to safety before the forerunner had resumed his position in front. This precaution was very necessary, for otherwise the dogs in the rear would make a course direct for wherever the front dogs happened to be, cutting across corners and most probably dragging their sledge sideways into a crevasse; the likeliest way to lose it altogether.

Often enough the dogs broke through the snow-bridges on the morning of the 23rd, but only once were matters serious, when Ninnis's sledge, doubtless on account of its extra weight, again broke through a lid of snow and was securely jammed in a crevasse just below the surface.

On this occasion we were in a serious predicament, for the sledge was in such a position that an unskilful movement would have sent it hurling into the chasm below. So the

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unpacking of the load was a tedious and delicate operation. The freight consisted chiefly of large, soldered tins, packed tightly with dried seal meat. Each of these weighed about ninety pounds and all were most securely roped to the sledge. The sledge was got up and reloaded without the loss of a single tin, and once more we breathed freely.

A valley almost free of crevasses was chosen as the upward track to the plateau. We threw in our weight hauling with the dogs, and had a long, steep drag over furrowed névé, pitching the tent after a day's journey of twelve miles.

On waking up on November 24 I found that my watch had stopped. I had been so tired on the previous evening that I had fallen asleep without remembering to wind it. The penalty of this accident was paid in my being forced to take an extra set of observations in order to start the watch again at correct time relative to the Hut.

Besides the observations for position, necessary for navigation, sets of angles were taken from time to time to fix the positions of objects of interest appearing within the field of view, while the magnetic variation was obtained at intervals. In this work Ninnis always assisted me. Mertz boiled the hypsometer when necessary to ascertain our elevation above sea-level. The meteorological conditions were carefully noted several times each day for future comparison with those of other parties and of Winter Quarters.

The day's work on November 24 brought us high up on the slopes. Away to the north-west Aurora Peak was still visible, standing up like a mighty beacon pointing the way back to the Hut. Below lay the Mertz Glacier extending out to sea as a floating tongue beyond the horizon. Inland, some twenty miles to the south, it mounted up in seamed and riven "cataracts" to a smooth, broad and shallow groove which wound into the ice-cap. Ahead, on our south-east course, the ground still rose, but to the north-east the ice-sheet fell away in long wide valleys, at the extremity of

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some of which icebergs were visible frozen into distant sea-ice.

The tent was raised at 10 P.M. in a forty-mile wind with light drift; temperature 10° F. The altitude of this camp was two thousand three hundred and fifty feet.

One of the worst features of drift overnight is that sledges and dogs become buried in snow and have to be dug out in the morning. Thus on the 25th it was 10 A.M. before we got away in a strong wind, with flying snow, across fields of sastrugi.

The dogs detested the wind and, as their heads were so near the ground, they must have found the incessant stream of thick drift very tantalizing. The snow became caked over their eyes so that every few minutes they had to scrape it away with their paws or rub their faces on the ground.

We stopped at 6 P.M. after a miserable day, covering sixteen miles in all.

November 26 broke overcast, the light being bad for travelling and the wind still strong. Nevertheless we set out at 10 A.M. through falling snow.

As the day progressed the wind subsided and Mertz was able to put on his skis over a surface which sloped gradually away to the east. The light was diffused uniformly over the irregularities of snow and ice so that depressions only a few feet away were invisible. Black objects, on the other hand, stood out with startling distinctness, and our attention was soon arrested by a hazy, dark patch which appeared in front and to the left. At first there was much doubt as to its nature, but it was soon clear that it must be a group of rocks, apparently situated at a considerable distance. They were subsequently found to be sixty miles away (Organ Pipe Cliffs, near Cape Blake).

Presently our course ended abruptly at the edge of a precipitous fall. We skirted round this for a while, but were ultimately forced to camp owing to the uncertainty of the light and the proximity of several large crevasses.

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At 11 P.M. the sky cleared and a better idea could be gained of what lay ahead. In a line between our elevated position and the distant rocky outcrops the ice fell in a steep descent to a broad, glacial valley, undulating and in places traversed by torn masses of sérac-ice. We examined the country to the east very carefully with a view to selecting a track for the journey next day and finally resolved to pass to the south of a large ice-capped island—Dixson Island, which was only about ten miles to the north-east, set within Ninnis Glacier near its western border.

On the 27th Mertz and I roped up, reconnoitred for a while and returned to the sledges. We then spent several hours in advancing a mile over badly broken ground, arriving at a slope covered with sastrugi and descending steeply for one thousand feet into the bed of the glacier.

In order the more safely to negotiate this, the dogs were all let loose excepting two in each sledge. Even then the sledges were often uncontrollable, rolling over and over many times before the bottom was reached.

When the dogs were re-harnessed it was found that Betli was missing and was not to be seen when we scanned the slopes in our rear with binoculars. It was expected that unless she had fallen into a crevasse she would turn up at the camp that night. However, she did not reappear, and we saw no more of her. Two other dogs, Jappy and Fusilier, had been previously killed, as neither was of any use as a puller. Blizzard, who had been always a great favourite with us, had to be shot next day.

When it had reached the edge of the glacier, our path led over a solid ocean rising and falling in billows, two hundred and fifty feet in height; no doubt caused by the glacier in its northward movement being compressed against the southern side of Dixson Island. Still, the "caravan" made considerable progress, ending with a day's journey of sixteen miles.

During the small hours of November 28 the wind rose to a velocity of sixty miles per hour, but gradually

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diminished to a twenty-knot breeze as the day advanced. Light snow fell from a sky which was densely clouded.

We still pursued a devious track amid rolling waves of ice, encountering beds of soft snow through which the sledges moved slowly. By 6 p.m. pinnacles and hummocks stood around on every side, and the light was such that one could not distinguish crevasses until he was on top of them. We had to camp and be satisfied with seven miles "to the good." By this time the dogs were in good training and grew noticeably ravenous. In the evening, before they were properly tethered, Shackleton seized a one-week provision bag, ripped it open and ate a block of butter weighing more than two and a half pounds. This was a loss to us, as butter was regarded as a particular delicacy.

The sun was shining brightly next day and it was at once evident that we were in a zone of tumbled and disrupted ice.

For many hours a way was won through a mighty turmoil of sérac and over innumerable crevasses with varied fortune. Just before lunch my two sledges were nearly lost through the dogs swinging sharply to one side before the second sledge had cleared a rather rotten snow-bridge. I was up with the dogs at the time, and the first intimation I received of an accident was on seeing the dogs and front sledge being dragged backwards; the rear sledge was hanging vertically in a crevasse. Exerting all my strength I held back the front sledge, and in a few moments was joined by Ninnis and Mertz, who soon drove a pick and ice-axe down between the runners and ran out an anchoring rope.

It was a ticklish business recovering the sledge which hung suspended in the crevasse. It could not be lifted vertically as its bow was caught in a V-shaped cornice formed by an overhanging mass of snow. To add to our troubles the ground all about the place was precarious and unsafe.

Mertz and Ninnis therefore lowered me down and I attached a rope to the tail-end of the sledge. The bow-rope and tail-rope were then manipulated alternately until

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the bow of the sledge was manœuvred slowly through the gaping hole in the snow-lid and was finally hauled up on to level ground. No more remarkable test of the efficiency of the sledge straps and the compactness of the load could have been made.

After lunch Mertz ascended a high point and was able to trace out a route which conducted us in a few hours to a better surface.

We were now at an elevation of from four hundred to five hundred feet above sea-level, running across a beam-wind on our right which increased during the afternoon. A rising blizzard made it necessary to camp after a day's run of ten and one-third miles.

The wind blew up to seventy miles an hour during the night, but eased in strength early on November 30. At 10 A.M. we tried to make a start, but the dogs refused to face the drift. On the wind becoming gusty in the afternoon, it was once more possible to travel, and we set out.

Dense drift was still to be seen pouring over the highlands to the south-east. Above the glacier ahead whirlies, outlined in high revolving columns of snow, "stalked about" in their wayward courses.

The sledges ran through a sea of crevassed, blue ice, over ridges and past open chasms. Seven miles brought us to the "foot-hills" on the eastern border of the Ninnis Glacier, where we pitched camp.

The first day of December was still and hot, with brilliant sunshine. The shade temperature reached 34° F. and the snow became so sticky that it was as much as we and the dogs could do to move the sledges up the slopes. As the evening lengthened and the sun sank lower the surface froze hard and our toil was lightened. At midnight we reached an altitude of nine hundred feet.

December 2 was another warm, bright day. The surface was atrociously bad; hard, sharp sastrugi, never less than two feet high and in many instances three feet six inches from crest to trough. The dogs were not able to exert a

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united pull for there were never more than half of them in action at a time.

Once more we were at a comparatively high altitude and a fine view presented itself to the north. One could look back to the mainland slopes descending on the western side of the Ninnis Glacier. Then the glacier, tumultuous and broken, was seen to extend far out into the frozen sea and, sweeping round to the north-east, the eye ranged over a great expanse of floe-ice dotted with bergs. To the east there was a precipitous coastline of dark rock which for a while we thought of visiting. But then it seemed likely that Madigan's party would reach as far east, so we set our faces once more to the rising plateau in the south-east.

At midnight the sun was peering over the southern sky-line, and we halted at an elevation of one thousand five hundred and fifty feet, having covered eight and a half miles in the day. The temperature was 5° F.

*“December 3.—*We were not long on the way before the sky became overcast and light snow fell. The surface was becoming flatter. Camp was pitched at 11 P.M. after eleven and two-thirds miles.

*“December 4.—*Another day of bad light but the surface improved and good headway was made on an easterly course at an elevation of between two thousand and two thousand eight hundred feet. The crevasses were practically past. The day's march was fifteen miles.

*“December 5.—*A bad day; overcast, snowing and a gale of wind from the east-south-east. However, we plugged on blindly into it until 7.30 P.M. and then camped, having done eleven and a half miles.

*“December 6, 7 and 8.—*During these days a dense blizzard raged, the wind reaching seventy miles per hour. There was nothing to do but lie in our bags and think out plans for the future. Each morning Ninnis and Mertz took it in turns to go out and feed their charges, who were snugly buried in the deep snow.

“One day in the sleeping-bag does not come amiss after

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long marches, but three days on end is enough to bore any one thoroughly.

“Ninnis was not so badly off with a volume of Thackeray, but Mertz had come to the end of a small edition of ‘Sherlock Holmes’ when blizzard-bound near Aladdin’s Cave, and his only diversion on these days was to recite passages from memory for our mutual benefit.”

I was troubled with an inflammation in the face just at this time, while Ninnis suffered pain owing to a “whitlow” on one of his fingers.

As usual the food ration was reduced. This caused us to have more than ordinarily vivid dreams. I happened to be awake one night when Ninnis was sledging in imagination, vociferously shouting, “Hike, hike,” to the dogs; our equivalent of the usual “Mush, mush.”

Despite considerable wind and drift we got away at 8 A.M. on December 9. The sky was overcast and there was nothing to be seen except a soft carpet of newly fallen snow into which we sank half-way to the knees. The sledges ran deeply and heavily so that the dogs had to be assisted. Ahead Mertz glided along triumphant, for it was on such occasions that skis were of the greatest assistance to him.

During the day a snow petrel circled above us for a while and then returned to the north.

The course was due east at an elevation of two thousand three hundred feet and the total distance we threw behind during the day was sixteen and a half miles.

On the 10th light wind and low drift were the order of things. Our spirits rose when the sky cleared and a slight down grade commenced.

During the morning Ninnis drew our attention to what appeared to be small ice-capped islets fringing the coast, but the distance was too great for us to be sure of their exact nature. Out near the verge of the horizon a tract of frozen sea with scattered bergs could be seen.

Next day more features were distinguishable. The coast was seen to run in a north-easterly direction as a long

SLEDGING IN ADELIE LAND

From a crayon by Van Waterschoot van der Gracht



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peninsula ending in a sharp cape—Cape Freshfield. The north appeared to be filled with frozen sea though we could not be certain that it was not dense pack-ice. Little did we know that Madigan's party, about a week later, would be marching over the frozen sea towards Cape Freshfield in the north-east.

At 10 P.M. on the 11th, at an altitude of one thousand eight hundred feet, the highland we were traversing fell away rapidly and sea-ice opened up directly in front of us. The coastal downfalls to the south-east fell in rugged masses to a vertical barrier, off the seaward face of which large, tabular bergs were grouped within enviroing floe.

Throughout December 12 a somewhat irregular course was made to the south-east and south to avoid the broken area ahead. We had had enough of crevasses and wished to be clear of sérac-ice in the future.

For some days Ninnis had been enduring the throbbing pain of a whitlow and had not been having sufficient sleep. He always did his share of the work and had undoubtedly borne a great deal of pain without showing it. On several nights I noticed that he sat up in his sleeping-bag for hours puffing away at a pipe or reading. At last the pain became so acute that he asked me to lance his finger. This was successfully accomplished after breakfast on the 13th and during the day he had much relief.

While Ninnis rested before we made a start, Mertz and I re-arranged the sledges and their loads. A third sledge was no longer necessary, so the one usually driven by Ninnis, which had been damaged, was discarded and all the gear was divided between the other two sledges in nearly equal amounts. When the work was completed, the rear sledge carried an extra weight of fifty pounds. As, however, both food for men and dogs were to come from it, we reckoned that this superadded load would soon diminish.

On we went, during the afternoon, up a steep ascent. Crevasses were so numerous that we took measures to circumvent them. Some were as much as a hundred feet in width,

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filled with snow ; others were great open holes or like huge cauldrons. Close to the windward edge of some of the latter high ramps of névé with bluff faces on the windward side stood up like monoliths reaching twenty-five feet in maximum height.

In the evening a field of névé was reached and we felt more placid after the anxiety of the preceding hours.

During the passage of a snow-filled valley a dull, booming sound like the noise of far-distant cannon was heard. It was evidently connected with the subsidence of large areas of the surface crust. Apparently large cavities had formed beneath the snow and the weight of ourselves and the sledges caused the crust to sink and the air to be expelled.

The sun appeared late in the day and, as it was almost calm, the last few hours of marching were very pleasant. At midnight we camped at an altitude of one thousand nine hundred feet.

A light east-south-east wind was blowing as the sledges started away eastward on the morning of December 14. The weather was sunny and the temperature registered 21° F.

Mertz and I were happy to know that Ninnis had slept well and was feeling much better.

Our march was interrupted at noon by a latitude observation, after which Mertz went ahead on skis singing his student songs. The dogs rose to the occasion and pulled eagerly and well. Everything was for once in harmony and the time was at hand when we should turn our faces homewards.

Mertz was well in advance of us when I noticed him hold up his ski-stick and then go on. This was a signal for something unusual so, as I approached the vicinity, I looked out for crevasses or some other explanation of his action. As a matter of fact crevasses were not expected, since we were on a smooth surface of névé well to the southward of the broken coastal slopes.



LIEUTENANT B. E. S. NIXNIS, R.F., IN UNIFORM



Hurley
MERTZ, NIXNIS AND MAWSON ERECTING THE TENT IN A HIGH WIND



Hurley
A LATER STAGE IN ERECTION OF THE TENT IN A WIND (ONE MAN IS INSIDE)

ACROSS KING GEORGE V LAND

On reaching the spot where Mertz had signalled and seeing no sign of any irregularity, I jumped on to the sledge, got out the book of tables and commenced to figure out the latitude observation taken on that day. Glancing at the ground a moment after, I noticed the faint indication of a crevasse. It was but one of many hundred similar ones we had crossed and had no specially dangerous appearance, but still I turned quickly round, called out a warning word to Ninnis and then dismissed it from my thoughts.

Ninnis, who was walking along by the side of his sledge, close behind my own, heard the warning, for in my backward glance I noticed that he immediately swung the leading dogs so as to cross the crevasse squarely instead of diagonally as I had done. I then went on with my work.

There was no sound from behind except a faint, plaintive whine from one of the dogs which I imagined was in reply to a touch from Ninnis's whip. I remember addressing myself to George, the laziest dog in my own team, saying, "You will be getting a little of that, too, George, if you are not careful."

When I next looked back, it was in response to the anxious gaze of Mertz who had turned round and halted in his tracks. Behind me, nothing met the eye but my own sledge tracks running back in the distance. Where were Ninnis and his sledge?

I hastened back along the trail thinking that a rise in the ground obscured the view. There was no such good fortune, however, for I came to a gaping hole in the surface about eleven feet wide. The lid of a crevasse had broken in; two sledge tracks led up to it on the far side but only one continued on the other side.

Frantically waving to Mertz to bring up my sledge, upon which there was some alpine rope, I leaned over and shouted into the dark depths below. No sound came back but the moaning of a dog, caught on a shelf just visible one hundred and fifty feet below. The poor creature appeared to have broken its back, for it was attempting

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to sit up with the front part of its body while the hinder portion lay limp. Another dog lay motionless by its side. Close by was what appeared in the gloom to be the remains of the tent and a canvas tank containing food for three men for a fortnight.

We broke back the edge of the névé lid and took turns leaning over secured by a rope, calling into the darkness in the hope that our companion might be still alive. For three hours we called unceasingly but no answering sound came back. The dog had ceased to moan and lay without a movement. A chill draught was blowing out of the abyss. We felt that there was little hope.

Why had the first sledge escaped the crevasse? It seemed that I had been fortunate, because my sledge had crossed diagonally, with a greater chance of breaking the snow-lid. The sledges were within thirty pounds of the same weight. The explanation appeared to be that Ninnis had walked by the side of his sledge, whereas I had crossed it sitting on the sledge. The whole weight of a man's body bearing on his foot is a formidable load and no doubt was sufficient to smash the arch of the roof.

By means of a fishing line we ascertained that it was one hundred and fifty feet sheer to the ledge on which the remains were seen; on either side the crevasse descended into blackness. It seemed so very far down there and the dogs looked so small that we got out the field glasses, but could make out nothing more by their aid.

All our available rope was tied together but the total length was insufficient to reach the ledge and any idea of going below to investigate and to secure some of the food had to be abandoned.

Stunned by the unexpectedness of it all and having exhausted the few appliances we carried for such a contingency, we felt helpless. In such moments action is the only tolerable thing, and if there had been any expedient however hazardous which might have been tried, we should have taken all and more than the risk. Stricken dumb with

ACROSS KING GEORGE V LAND

the pity of it and heavy at heart, we turned our minds mechanically to what lay nearest at hand.

There were rations on the other sledge, and we found that there was a bare one and a half weeks' food for ourselves and nothing at all for the dogs. Part of the provisions consisted of raisins and almonds which had been taken as extras or "perks," as they were usually called.

Among other losses there were both spade and ice-axe, but fortunately a spare tent-cover was saved. Mertz's burberry trousers had gone down with the sledge and the best substitute he could get was a pair of thick Jaeger woollen under-trousers from the spare clothing we possessed.

Later in the afternoon Mertz and I went ahead to a higher point in order to obtain a better view of our surroundings. At a point two thousand four hundred feet above sea-level and three hundred and fifteen and three-quarter miles eastward from the Hut, a complete observation for position and magnetic azimuth was taken.

The coastal slopes were fearfully broken and scaured in their descent to the sea, which was frozen out to the horizon. No islands were observed or anything which could correspond with the land marked by Wilkes as existing so much farther to the north. Patches of "water sky" were visible in two places in the far distance. As we stood looking north a Wilson petrel suddenly appeared and after flitting about for a short time departed.

We returned to the crevasse and packed the remaining sledge, discarding everything unnecessary so as to reduce the weight of the load. A thin soup was made by boiling up all the old food-bags which could be found. The dogs were given some worn-out fur mitts, finnesko and several spare raw hide straps, all of which they devoured.

We still continued to call down into the crevasse at regular intervals in case our companion might not have been killed outright and, in the meantime, have become conscious. There was no reply.

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A weight was lowered on the fishing line as far as the dog which had earlier shown some signs of life, but there was no response. All were dead, swallowed up in an instant.

When comrades tramp the road to anywhere through a lonely blizzard-ridden land in hunger, want and weariness the interests, ties and fates of each are interwoven in a wondrous fabric of friendship and affection. The shock of Ninnis's death struck home and deeply stirred us.

He was a fine fellow and a born soldier—and the end:—

Life—give me life until the end,
That at the very top of being,
The battle spirit shouting in my blood,
Out of very reddest hell of the fight
I may be snatched and flung
Into the everlasting lull,
The Immortal, Incommunicable Dream.

At 9 P.M. we stood by the side of the crevasse and I read the burial service. Then Mertz shook me by the hand with a short "Thank you!" and we turned away to harness up the dogs.

CHAPTER XIII

TOIL AND TRIBULATION

THE homeward track! A few days ago—only a few hours ago—our hearts had beat hopefully at the prospect and there was no hint of this, the overwhelming tragedy. Our fellow, comrade, chum, in a woeful instant, buried in the bowels of the awful glacier. We could not think of it; we strove to forget it in the necessity of work, but we knew that the truth would assuredly enter our souls in the lonely days to come. It was to be a fight with Death and the great Providence would decide the issue.

On the outward journey we had left no depots of provisions en route, for it was our bad fortune to meet such impossible country that we had decided to make a circuit on our return to Winter Quarters sufficiently far inland to avoid the coastal irregularities. As a matter of fact, on the very day of the calamity, preparations had been made to cache most of the food within twenty-four hours, as during the last few days of the journey we were to make a dash to our "farthest east" point. Such were the plans, and now we were ranged against unexpected odds.

With regard to the dogs, there were six very miserable animals left. The best of them had been drafted into the rear team, as it was expected that if an accident happened through the collapse of a snow-bridge the first sledge would most probably suffer. For the same reason most of the food and other indispensable articles had been carried on the rear sledge.

All the dogs which had perished were big and powerful;

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Basilisk, Ginger Bitch, Shackleton, Castor, Franklin and John Bull. We had fully anticipated that those at least would come back alive, at the expense of the six dogs in my sledge.

A silent farewell!—and we started back, aiming to reach our camping-ground on December 12 before a snowstorm intervened, as several things had been left there which would be of use to us in our straitened circumstances. The weather still held good and there were no signs of approaching snow or wind. So Mertz went ahead on skis, while we plodded slowly up the hills and dashed recklessly down them. During the descents I sat on the sledge and we slid over long crevassed slopes in a wild fashion, almost with a languid feeling that the next one would probably swallow us up. But we did not much care then, as it was too soon after losing our friend.

At 2.30 A.M. on December 15 the discarded sledge and broken spade came into sight. On reaching them, Mertz cut a runner of the broken sledge into two pieces which were used in conjunction with his skis as a framework on which to pitch the spare tent-cover; our only tent and poles having been lost. Each time the makeshift shelter was erected, these props had to be carefully lashed together at the apex, which stood four feet from the ground. Inside, there was just room for two one-man sleeping-bags on the floor. However, only one man at a time could move about and neither of us could ever rise above a sitting posture. Still, it was a shelter which protected us from the bad weather, and, with plenty of snow blocks piled around it, was wonderfully resistant to the wind.

When we retired to rest, it was not to sleep but to think out the best plan for the return journey.

It was obvious that a descent to the frozen sea would be dangerous on account of the heavily crevassed nature of the falling glacier, delay would undoubtedly be caused and our distance from the Hut would be increased. To decide definitely for the sea-ice would be to take other

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risks as well, since, from the altitude at which we were placed, we could not be sure that the floe-ice which covered the sea would provide a good travelling surface. In any case it was likely to be on the point of breaking up, for the season was nearing midsummer. On the other hand, there was on the sea-ice a chance of obtaining seals for food.

After due consideration we resolved to follow the shorter route, returning inland over the plateau, for it was reckoned that if the weather were reasonable we might win through to Winter Quarters with one and a half weeks' rations and the six dogs which still remained, provided we ate the dogs to eke out our provisions. Fortunately neither the cooker nor the kerosene had been lost.

George, the poorest of the dogs, was killed and partly fed to the others, partly kept for ourselves. The meat was roughly fried on the lid of the aluminium cooker, an operation which resulted in little more than scorching the surface. On the whole it was voted good though it had a strong, musty taste and was so stringy that it could not be properly chewed.

As both mugs and spoons had been lost, I made two pannikins out of tins in which cartridges and matches had been packed, and Mertz carved wooden spoons out of a portion of the broken sledge. At this camp he also spliced the handle of the broken shovel which had been picked up, so as to make it temporarily serviceable.

It was midsummer, and therefore we found it easier to drag the sledge over the snow at night when the surface was frozen hard. Camp was not finally broken until 6 P.M., when the long and painful return journey commenced.

For fourteen miles the way led up rising snow slopes to the north-west until an elevation of two thousand five hundred feet had been reached. After that, variable grades and flat country were met. Though the sledge was light, the dogs required helping and progress was slow. The midnight sun shone low in the south, and we tramped on

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through the morning hours, anxious to reduce the miles which lay ahead.

Early on December 16 the sky became rapidly overcast. The snowy land and the snowy sky merged to form an enclosed trap, as it seemed to us, while showers of snow fell. There were no shadows to create contrast; it was impossible to distinguish even the detail of the ground underfoot. We stumbled over unseen ridges of the hard *névé*, our gaze straining forward. The air was so still that advantage was taken of the calm to light the primus and melt some snow in the lee of the sledge. The water, to which were added a few drops of primus alcohol, helped to assuage our thirst.

The erection of the makeshift tent was a long and tedious operation, and so, on our return marches, we never again took any refreshment during the day's work excepting on this occasion.

At 6 A.M., having done twenty miles and ascended to an elevation of about two thousand five hundred feet, we pitched camp.

There was very little sleep for me that day for I had an unusually bad attack of snow-blindness. During the time that we rested in the bags Mertz treated one of my eyes three times, the other twice with zinc sulphate and cocaine.

On account of the smallness of the tent a great deal of time was absorbed in preparations for "turning in" and for getting away from each camp. Thus, although we rose before 6 P.M. on December 16, the start was not made until 8.30 P.M., notwithstanding the fact that the meal was of the "sketchiest" character.

On that night ours was a mournful procession; the sky thickly clouded, snow falling, I with one eye bandaged and the dog Johnson broken down and strapped on top of the load on the sledge. There was scarcely a sound; only the rustle of the thick, soft snow as we pushed on, weary but full of hope. The dogs dumbly pressed forward in their harness, forlorn but eager to follow. Their weight now told little



DR. XAVIER MERTZ

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von den Spalte & Ziel die gestand Spalte aufpassen
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alles in einer Stunde geht in ein die Wasser
fort, nur eine Theil dieses kommen sich late für
müht

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TOIL AND TRIBULATION

upon the sledge, the work mainly falling upon ourselves. Mertz was tempted to try hauling on skis, but came to the conclusion that it did not pay and thenceforth never again used them.

Close to the Magnetic Pole as we were, the compass was of little use, and to steer a straight course to the west without ever seeing anything of the surroundings was a difficult task. The only check upon the correctness of the bearing was the direction in which trended the old hard winter sastrugi, channelled out along a line running almost north and south. The newly fallen snow obliterated these, and frequent halts had to be called in order to investigate the buried surface.

At 2 A.M. on the 17th we had only covered eleven miles when we stopped to camp. Then Mertz shot and cut up Johnson while I prepared the supper.

Johnson had always been a very faithful, hard-working and willing beast, with rather droll ways of his own, and we were sorry that his end should come so soon. He could never be accused of being a handsome dog, in fact he was generally disreputable and dirty.

All the dogs were miserable and thin when they reached the stage of extreme exhaustion. Their meat was tough, stringy and without a vestige of fat. For a change we sometimes chopped it up finely, mixed it with a little pemmican, and brought all to the boil in a large pot of water. We were exceedingly hungry, but there was nothing to satisfy our appetites. Only a few ounces were used of the stock of ordinary food, to which was added a portion of dog's meat, never large, for each animal yielded so very little, and the major part was fed to the surviving dogs. They crunched the bones and ate the skin, until nothing remained.

A fresh start was made at 7.30 P.M. and a wretched, trying night was spent, when we marched without a break for twelve and a half hours. Overhead there was a dense pall of nimbus from which snow fell at intervals. None of the dogs except Ginger gave any help with the load, and

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Mary was so worn out that she had to be carried on the sledge. Poor Mary had been a splendid dog, but we had to kill her at the camp in the morning.

After a run of eighteen and a half miles we halted at 8 A.M. on December 18.

At 5.30 P.M. a light south-easter blew and snow fell from an overcast sky. Soon after a start was made, it became apparent that a descent was commencing. In this locality the country had been swept by wind, for none of the recent snow settled on the surface. The sastrugi were high and hard, and over them we bumped, slipping and falling in the uncertain light. We could not endure this kind of travelling for long and resolved to camp shortly after midnight, intending to go on when the day had advanced further and the light was stronger.

“*December 19.*—Up at noon and tried a few more miles in the snow-glare. Later in the afternoon the sky began to break and we picked our way with less difficulty. Camped at 5 P.M., having done only twelve miles one thousand and fifty yards since the morning of December 18.

“Up at 8 P.M. again, almost calm and sun shining. Still continuing a westerly course we dropped several hundred feet, marching over rough, slippery fields of sastrugi.”

In the early morning hours of the 20th the surface changed to ice and occasional crevasses appeared. It was clear that we had arrived at the head of the Ninnis Glacier above the zone of sérac we had traversed on the outward journey. It was very satisfactory to know this; to be certain that some landmark had been seen and recognized.

Soon after this discovery we came near losing Haldane, the big grey wolf, in a crevasse. Miserably thin from starvation the wretched dogs no longer filled their harness. As we pulled up Haldane, after he had broken into a deep, sheer-walled crevasse, his harness slipped off just as he reached the top. It was just possible to seize hold of his hair at that moment and to land him safely, otherwise we should have lost many days' rations.

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He took to the harness once more but soon became uncertain in his footsteps, staggered along and then tottered and fell. Poor brutes! that was the way they all gave in—pulling till they dropped.

We camped at 4 A.M., thinking that a rest would revive Haldane. Inside the tent some snow was thawed, and we drank the water with an addition of a little primus spirit. A temperature reading showed -1° F.

Outside, the hungry huskies moaned unceasingly until we could bear to hear them no longer. The tent was struck and we set off once more.

Haldane was strapped on the sledge as he could not walk. He had not eaten the food we had given him, because his jaws seemed too weak to bite. He had just nursed it between his paws and licked it.

Before the dogs became as weak as this, great care had to be taken in tethering them at each camp so as to prevent them from gnawing the wood of the sledge, the straps or, in fact, anything at all. Every time we were ready for a fresh start they seemed to regain their old strength, for they struggled and fought to seize any scraps, however useless, left on the ground.

The day's march was completed at 10.30 A.M. and fourteen and a half miles lay behind.

"We were up again at 11.20 P.M. Sky clear; fifteen-mile breeze from the south-south-east and the temperature 3° F. By midnight there was a thirty-mile wind and low, flying drift.

"*December 21.*—The night-march was a miserable one. The only thing which helped to relieve it was that for a moment Dixson Island was miraged up in the north, and we felt that we had met an old friend, which means a lot in this icy desolation. The surface was furrowed by hard, sharp sastrugi.

"We camped at 9 A.M. after only eleven miles. Haldane was finished off before we retired.

"We were up again at 9 P.M., and when a start was made

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at 11 P.M. there was a strong south-south-east wind blowing, with low drift; temperature, zero Fahr.

“*December 22.*—The surface of hard, polished sastrugi caused many falls. The track was undulating, rising in one case several hundred feet and finally falling in a long slope.

“Pavlova gave in late in the march and was taken on the sledge.

“Camped at 6.40 A.M. in a forty-mile wind with low drift. Distance marched was twelve miles one thousand four hundred yards.

“Before turning in, we effected sundry repairs. Mertz re-spliced the handle of the shovel which had broken apart and I riveted the broken spindle of the sledge-meter. The mechanism of the latter had frozen during the previous day’s halt, and, on being started, its spindle had broken off short. It was a long and tedious job tapping at the steel with a toy hammer, but the rivet held miraculously for the rest of the journey.

“Up at 11.30 P.M., a moderate breeze blowing, overcast sky, light snow falling.”

On December 23 an uphill march commenced which was rendered very heavy by the depth of the soft snow. Pavlova had to be carried on the sledge.

Suddenly, gaping crevasses appeared dimly through the falling snow which surrounded us like a blanket. There was nothing to do but camp, though it was only 4.30 A.M., and we had covered but five miles one thousand two hundred and thirty yards.

Pavlova was killed and we made a very acceptable soup from her bones. In view of the dark outlook, our ration of food had to be still further cut down. We had no proper sleep, hunger gnawing at us all the time, and the question of food was for ever in our thoughts. Dozing in the fur bags, we dreamed of gorgeous “spreads” and dinner-parties at home. Tramping along through the snow, we racked our brains thinking of how to make the most of the meagre quantity of dogs’ meat at hand.

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The supply of kerosene for the primus stove promised to be ample, for none of it had been lost in the accident. We found that it was worth while spending some time in boiling the dogs' meat thoroughly. Thus a tasty soup was prepared as well as a supply of edible meat in which the muscular tissue and the gristle were reduced to the consistency of a jelly. The paws took longest of all to cook, but, treated to lengthy stewing, they became quite digestible.

On December 24 we were up at 8 A.M. just as the sun commenced to gleam through clouds. The light was rather bad, and snow fell as the track zigzagged about among many crevasses; but suddenly the sun broke forth. The sledge was crossing a surface of deep snow which soon became so sticky that the load would scarcely move. At last a halt was made after four miles, and we waited for the evening, when the surface was expected to harden.

A small prion visited us but went off in a moment. It is very remarkable how far some Antarctic sea-birds may wander inland, apparently at such a great distance from anything which should interest them. We were then more than one hundred miles south of the open sea. As the bird flew away, we watched it until it disappeared in the north, wishing that we too had wings to cross the interminable plateau ahead.

Lying in the sleeping-bag that day I dreamt that I visited a confectioner's shop. All the wares that were displayed measured feet in diameter. I purchased an enormous delicacy just as one would buy a bun under ordinary circumstances. I remember paying the money over the counter, but something happened before I received what I had chosen. When I realized the omission I was out in the street, and, being greatly disappointed, went back to the shop, but found the door shut and "early closing" written on it.

Though a good daily average had been maintained on the march whenever conditions were at all favourable,

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the continuance of bad weather and the undoubtedly weaker state in which we found ourselves made it imperative to dispense with all but the barest necessities. Thus the theodolite was the only instrument retained, and the camera, photographic films (exposed and unexposed), hypsometer, thermometers, rifle, ammunition and other sundries were all thrown away. The frame of the tent was made lighter by constructing two poles, each four feet high, from the telescopic theodolite legs, the heavier pieces of sledge-runner being discarded.

We were up at 11 P.M. on December 24, but so much time was absorbed in making a dog-stew for Christmas that it was not till 2.30 A.M. that we got under way. We wished each other happier Christmases in the future, and divided two scraps of biscuit which I found in my spare kit-bag; relics of better days.

The surface was a moderately good one of undulating, hard sastrugi, and, as the course had been altered to north-west, the southerly wind helped us along. The sun shone brightly, and only for the wind and the low drift we might have felt tolerably comfortable. On our right, down within the shallow depression of the Ninnis Glacier, the low outline of Dixson Island, forty miles to the north, could be seen miraged up on the horizon.

The tent was raised at 9.30 A.M. after a run of eleven miles one hundred and seventy-six yards. An ounce each of butter was served out from our small stock to give a festive touch to the dog-stew.

At noon I took an observation for latitude, and, after taking a bearing on to Dixson Island, computed that the distance in an air-line to Winter Quarters was one hundred and sixty miles.

December 26.—Got away at 2 A.M.; the surface undulating and hummocky with occasional beds of soft snow. Sun shining, wind ranged between thirty and forty miles per hour with much low drift; cold; camped about noon having done ten miles five hundred and twenty-eight yards.

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“We have reached the western side of the Ninnis Glacier. Ahead are rising slopes, but we look forward to assistance from the wind in the ascent.

“I was again troubled with a touch of snow-blindness, but it responded to the usual treatment.

“At 11 P.M. we were at it again, but what with preparing dog-stew, packing up within the limited area of the tent and experimenting with a sail, it was five hours before the march commenced.

“The sail was the tent-cover, attached to the top of one ski lashed vertically as a mast and secured below to the other ski, lashed across the sledge as a boom.”

A start was made at 4 A.M. on the 27th in a thirty-mile wind accompanied by low drift. The surface was smooth but grew unexpectedly soft at intervals, while the ascent soon began to tell on us. Though the work was laborious, notwithstanding some aid from the sail, the bright sunlight kept up our spirits, and, whenever a halt was called for a few minutes' spell, the conversation invariably turned upon the subject of food and what we should do on arrival on board the *Aurora*.

At noon the sledge-meter showed nine miles one thousand four hundred yards, and we agreed to halt and pitch camp.

The wind had fallen off considerably, and in the brilliant sunshine it was comparatively warm in the tent. The addition of the heat from the primus stove, kept burning for an unusually long time during the preparation of the meat, caused a thaw of drift-snow which became lodged on the lee side of the tent. Thus we had frequently to put up with an unwelcome drip. Moisture came from the floor also, as there was no floor-cloth, and the sleeping-bags were soon very wet and soggy. As soon as the cooking was finished, the tent cooled off and the wet walls froze and became stiff with icy cakes.

At this time we were eating largely of the dogs' meat, to which was added one or two ounces of chocolate or raisins, three or four ounces of pemmican and biscuit mixed

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together, and, as a beverage, very dilute cocoa. The total weight of solid food consumed by each man per day was approximately fourteen ounces. Our small supply of butter and glaxo was saved for emergency, while a few tea-bags which remained were boiled over and over again.

The march commenced on December 28 at 3 A.M. in a thirty-mile wind accompanied by light drift. Overhead there was a wild sky which augured badly for the next few days. It was cold work raising the sail, and we were glad to be marching.

Our faithful retainer Ginger could walk no longer and was strapped on the sledge. She was the last of the dogs and had been some sort of a help until a few days before. We were sad when it came to finishing her off.

On account of the steep up grade and the weight of Ginger on the sledge, we camped at 7.15 A.M. after only four miles one thousand two hundred and thirty yards.

We had breakfast off Ginger's skull and brain. I can never forget the occasion. As there was nothing available to divide it, the skull was boiled whole. Then the right and left halves were drawn for by the old and well-established sledging practice of "shut-eye," after which we took it in turns eating to the middle line, passing the skull from one to the other. The brain was afterwards scooped out with a wooden spoon.

On sledging journeys it is usual to apportion all food-stuffs in as nearly even halves as possible. Then one man turns away and another, pointing to a heap, asks "Whose?" The reply from the one not looking is "Yours" or "Mine" as the case may be. Thus an impartial and satisfactory division of the rations is made.

After the meal I went on cooking more meat so as to have a supply in readiness for eating. It was not till 2 P.M. that the second lot was finished. The task was very trying, for I had to sit up on the floor of the tent for hours in a cramped position, continually attending to the cooker, while Mertz in his sleeping-bag was just accom-

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modated within the limited space which remained. The tent was too small either to lie down during the operation or to sit up comfortably on a sleeping-bag.

At 9.30 P.M. Mertz rose to take a turn at the cooking, and at 11 P.M. I joined him at "breakfast."

At this time a kind of daily cycle was noted in the weather. It was always calmest between 4 P.M. and 6 P.M. During the evening hours the wind increased until it reached a maximum between four and six o'clock next morning, after which it fell off gradually.

We were away at 2.30 A.M. on the 29th in a thirty-mile wind which raised a light drift. The sail was found to be of great assistance over a surface which rose in terraces of fifty to one hundred feet in height, occurring every one to one and a half miles. This march lasted for six hours, during which we covered seven miles five hundred and twenty-eight yards.

On December 30 the ascent continued and the wind was still in the "thirties." After several hours we overtopped the last terrace and stood on flat ground—the crest of a ridge.

Tramping over the plateau, where reigns the desolation of the outer worlds, in solitude at once ominous and weird, one is free to roam in imagination through the wide realm of human experience to the bounds of the great Beyond. One is in the midst of infinities—the infinity of the dazzling white plateau, the infinity of the dome above, the infinity of the time past since these things had birth, and the infinity of the time to come before they shall have fulfilled the Purpose for which they were created. We, in the midst of the illimitable, could feel with Marcus Aurelius that "Of life, the time is a point."

By 9 A.M. we had accomplished a splendid march of fifteen miles three hundred and fifty yards, but the satisfaction we should have felt at making such an inroad on the

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huge task before us was damped by the fact that I suddenly became aware that Mertz was not as cheerful as usual. I was at a loss to know the reason, for he was always such a bright and companionable fellow.

At 10.15 P.M. the sky had become overcast, snow was falling and a strong wind was blowing. We decided to wait for better conditions.

On New Year's Eve at 5.30 A.M. the wind was not so strong, so we got up and prepared for the start.

Mertz said that he felt the dogs' meat was not doing him much good and suggested that we should give it up for a time and eat a small ration of the ordinary sledging food, of which we had still some days' supply carefully husbanded. I agreed to do this and we made our first experiment on that day. The ration tasted very sweet compared with dogs' meat and was so scanty in amount that it left one painfully empty.

The light was so atrocious for marching that, after stumbling along for two and a half miles, we were obliged to give up the attempt and camp, spending the day in sleeping-bags.

In the evening at 9.30 P.M. the sun appeared for a brief moment and the wind subsided. Another stage was therefore attempted but at considerable cost, for we staggered along in the bewildering light, continually falling over unseen sastrugi. The surface was undulating with a tendency to down grades. Two sets of sastrugi were found crossing one another, and, in the absence of the sun, we could not be sure of the course, so the camp was pitched after five miles.

“*January 1, 1913.*—Outside, an overcast sky and falling snow. Mertz was not up to his usual form and we decided not to attempt blundering along in the bad light, believing that the rest would be advantageous to him.

“He did not complain at all except of the dampness of his sleeping-bag, though when I questioned him particularly he admitted that he had pains in the abdomen. As I had

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a continuous gnawing sensation in the stomach, I took it that he had the same, possibly more acute.

“After New Year’s Day he expressed a dislike to biscuit, which seemed rather strange. Then he suddenly had a desire for glaxo and our small store was made over to him, I taking a considerable ration of the dogs’ meat in exchange.

“It was no use, however, for when we tried to cover a few more miles the exertion told very heavily on him, and it was plain that he was in a more serious condition than myself.

“*January 2.*—The same abominable weather. We eat only a few ounces of chocolate each day.

“*January 3.*—In the evening the sky broke and the sun looked through the clouds. We were not long in packing up and getting on the way. The night was chilly and Mertz got frost-bitten fingers, so camp was pitched after four miles one thousand two hundred and thirty yards.

“*January 4.*—The sun was shining and we had intended rising at 10 A.M., but Mertz was not well and thought that the rest would be good for him. I spent the time improving some of the gear, mending Mertz’s clothing and cooking a quantity of the meat.

“*January 5.*—The sky was overcast, snow was falling, and there was a strong wind. Mertz suggested that as the conditions were so bad we should delay another day.

“Lying in the damp bags was wretched and was not doing either of us any good, but what was to be done? Outside, the conditions were abominable. My companion was evidently weaker than I, and it was apparently quite true that he was not making much of the dogs’ meat.

“*January 6.*—A better day but the sky remained overcast. Mertz agreed to try another stage.”

The grade was slightly downhill and the wind well behind. Unfortunately the surface was slippery and irregular and falls were frequent. These told very much upon my companion until, after consistently demurring, he at last consented to ride on the sledge. With the wind blowing

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behind us, it required no great exertion to bring the load along, though it would often pull up suddenly against sastrugi. After we had covered two and a half miles, Mertz became so cold through inaction in the wind that there was nothing to do but pitch the tent.

Mertz appeared to be depressed and, after the short meal, sank back into his bag without saying much. Occasionally, during the day, I would ask him how he felt, or we would return to the old subject of food. It was agreed that on our arrival on board the *Aurora* Mertz was to make penguin omelettes, for we had never forgotten the excellence of those we had eaten just before leaving the Hut.

Reviewing the situation, I found that we were one hundred miles south-east of Winter Quarters where food and plenty awaited us. At the time we had still ordinary rations for several days. How short a distance it would seem to the vigorous, but what a lengthy journey for the weak and famished !

The skin was peeling off our bodies and a very poor substitute remained which burst readily and rubbed raw in many places. One day, I remember, Mertz ejaculated, "Just a moment," and, reaching over, lifted from my ear a perfect skin-cast. I was able to do the same for him. As we never took off our clothes, the peelings of hair and skin from our bodies worked down into our under-trousers and socks, and regular clearances were made.

During the evening of the 6th I made the following note in my diary :

"A long and wearisome night. If only I could get on ; but I must stop with Xavier. He does not appear to be improving and both our chances are going now."

"*January 7.*—Up at 8 A.M., it having been arranged last night that we would go on to-day at all costs, sledge-sailing, with Xavier in his bag on the sledge." It was a sad blow to me to find that Mertz was in a weak state and required helping in and out of his bag. He needed rest for a few hours at least before he could think of travelling.

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“I have to turn in again to kill time and also to keep warm, for I feel the cold very much now.”

“At 10 A.M. I get up to dress Xavier and prepare food, but find him in a kind of fit.” Coming round a few minutes later, he exchanged a few words and did not seem to realize that anything had happened. “. . . Obviously we can’t go on to-day. It is a good day though the light is bad, the sun just gleaming through the clouds. This is terrible; I don’t mind for myself but for others. . . . I pray to God to help us.”

“I cook some thick cocoa for Xavier and give him beef-tea; he is better after noon, but very low—I have to lift him up to drink.”

During the afternoon he had several more fits, then became delirious and talked incoherently until midnight, when he appeared to fall off into a peaceful slumber. So I toggled up the sleeping-bag and retired worn out into my own. After a couple of hours, having felt no movement from my companion, I stretched out an arm and found that he was stiff.

My comrade had been accepted into “the peace that passeth all understanding.” It was my fervent hope that he had been received where sterling qualities and a high mind reap their due reward. In his life we loved him; he was a man of character, generous and of noble parts.

For hours I lay in the bag, rolling over in my mind all that lay behind and the chance of the future. I seemed to stand alone on the wide shores of the world—and what a short step to enter the unknown future!

My physical condition was such that I felt I might collapse in a moment. The gnawing in the stomach had developed there a permanent weakness, so that it was not possible to hold myself up in certain positions. Several of my toes commenced to blacken and fester near the tips and the nails worked loose.

Outside, the bowl of chaos was brimming with drift-snow and I wondered how I would manage to break and pitch

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camp single-handed. There appeared to be little hope of reaching the Hut. It was easy to sleep on in the bag, and the weather was cruel outside. But inaction is hard to brook, and I thought of Service's lines :

Buck up, do your damndest and fight,
It's the plugging away that will win you the day.

If I failed to reach the Hut it would be something done to reach some prominent point likely to catch the eye of a search party, where a cairn might be erected and our diaries cached. And so I commenced to modify the sledge and camping gear to meet fresh requirements.

The sky remained clouded, but the wind fell off to a calm which lasted for several hours. I took the opportunity to set to work on the sledge, sawing it in halves with a pocket tool. A mast was made out of one of the rails of the discarded half of the sledge and a spar was cut from the other rail. The sledge-meter, very much battered, was still serviceable. Lastly, the load was cut down to a minimum by the elimination of all but the barest necessities.

Late on the evening of the 8th I took the body of Mertz, wrapped up in his sleeping-bag, outside the tent, piled snow blocks around it and raised a rough cross made of the two half-runners of the sledge.

On January 9 the weather was overcast and fairly thick drift was flying in a wind reaching about fifty miles an hour. As certain matters still required attention and my chances of re-erecting the tent were rather doubtful, if I had decided to move on, the start was delayed.

"I read the Burial Service over Xavier this afternoon. As there is little chance of my reaching human aid alive, I greatly regret inability at the moment to set out the detail of coastline met with for three hundred miles travelled and observations of glacier and ice-formations, etc.; the most of which latter are, of course, committed to my head.

"The approximate location of the camp is latitude $68^{\circ} 2' S.$, longitude $145^{\circ} 9' E.$ This is dead reckoning, as the

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theodolite legs have been out of action for some time, splinted together to form tent-props. I believe the truth lies nearer latitude $67^{\circ} 57'$ S., longitude $145^{\circ} 20'$ E., as the wind must have drifted us to the north."

During the afternoon I cut up Mertz's burberry jacket and roughly sewed it to a large canvas clothes-bag, making a sail which could be readily set or furled, so as to save delay in starting out or in camping.

January 10 was an impossible day for travelling on account of thick drift and high wind. I spent part of the time in reckoning up the amount of food remaining and in cooking the rest of the dogs' meat; the last device enabling me to leave behind some of the kerosene, of which there was still a good supply. Late in the afternoon the wind fell and the sun peered amongst the clouds just as I was in the middle of a long job riveting and lashing the broken shovel.

It was on January 11—a beautiful, calm day of sunshine—that I set out over a good surface with a slight down grade. From the start my feet felt lumpy and sore. They had become so painful after a mile of walking that I decided to make an examination of them on the spot, sitting in the sun on the sledge. The sight of my feet gave me quite a shock, for the thickened skin of the soles had separated in each case as a complete layer, and abundant watery fluid had escaped into the socks. The new skin underneath was very much abraded and raw.

I did what appeared to be the best thing under the circumstances: smeared the new skin with lanoline, of which there was a good store, and with bandages bound the skin soles back in place, as they were comfortable and soft in contact with the raw surfaces. Outside the bandages I wore six pairs of thick woollen socks, fur boots and a crampon over-shoe of soft leather. Then I removed most of my clothing and bathed in the glorious heat of the sun. A tingling sensation seemed to spread throughout my whole body, and I felt stronger and better.

When the day commenced with ideal weather I thought

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I would cover a long distance, but at 5.30 P.M., after six and a quarter miles, I felt nerve-worn and had to camp, "so worn that had it not been a delightful evening, I should not have found strength to erect the tent."

Though the medical outfit was limited, there were a fair number of bandages and on camping I devoted much time to tending raw patches all over the body, festering fingers and inflamed nostrils.

High wind and much drift put travelling out of the question on January 12, and in any case my feet needed a rest.

"*January 13.*—The wind subsided and the snow cleared off at noon. The afternoon was beautifully fine. Descended hard ice-slopes over many crevasses—almost all descent—but surface cut my feet up; at 8 P.M. camped, having done five and three-quarter miles—painful feet—on camping find feet worse than ever; things look bad but shall persevere. It is now 11 P.M. and the glacier is firing off like artillery—appears to send up great jets of imprisoned air."

During the march Aurora Peak showed up to the west, about twenty miles away, across the Mertz Glacier. I felt happy at thus fixing my position, and at the sight of the far plateau which led onwards to Winter Quarters.

The glacier was the next obstacle to advance. To the south-west it descended from the plateau in immense broken folds. Pressing northward it was torn into the jumbled crush of sérac-ice, sparkling beneath an unclouded sun. The idea of diverging to the west and rounding the ice-falls occurred to me, but the detours involved other difficulties, so I strove to pick out the best track across the valley.

A high wind which blew on the morning of the 14th diminished in strength by noon and allowed me to get away. The sun was so warm that the puckered ice underfoot was covered with a film of water and in some places small trickles ran away to disappear into crevasses.

Though the course was downhill to the Mertz Glacier, the sledge required a good deal of pulling owing to the wet

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runners. At 9 P.M., after travelling five miles, I pitched camp in the bed of the glacier.

Between 9.30 P.M. and 11 P.M. the "cannonading" heard on the previous night recommenced. The sounds, resembling the explosions of heavy guns, usually started higher up the glacier and ended down towards the sea. When I first heard them, I put my head outside the tent to see what was going on. The reports came at random from every direction, but there was no visible evidence as to how they were produced. Without a doubt they had something to do with the re-freezing and splitting of the ice owing to the evening chill; but the sounds seemed far too loud to be explained by this cause alone.

January 15—the date on which all the summer sledging parties were due at the Hut! It was overcast and snowing early in the day, and in a few hours the sun broke out and shone warmly. The travelling was so heavy over a soft snowy surface, partly melting, that I gave up, after one mile, and camped.

At 7 P.M. the surface had not improved, the sky was thickly obscured and snow fell. At 10 P.M. the snow was coming down heavily, and, since there were many crevasses in the vicinity, I resolved to wait.

On the 16th at 2 A.M. the snow was as thick as ever, but at 5 A.M. the atmosphere lightened and the sun appeared.

Without delay I broke camp. A favourable breeze sprang up, and with sail set I managed to proceed through the snowy "deluge" in short stages. The snow clung in lumps to the runners, which had to be scraped frequently. I passed some broken ridges and sank into several holes leading down to crevasses out of which it was possible to scramble easily.

After laboriously toiling up one long slope, I was just catching my breath at the top and the sledge was running easily when I noticed that the surface beneath my feet fell away steeply in front. I suddenly realized that I was on the brink of a great blue hole like a quarry. The sledge

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was following of its own accord and was rapidly gaining speed, so I turned and, exerting every effort, was just able to hold it back by means of the hauling-line from the edge of the abyss. I should think that there must have been an interval of quite a minute during which I held my ground without being able to make it budge. Then it slowly came my way, and the imminent danger was past.

The day's march was an extremely hard five miles. Before turning in I had an extra supper of jelly soup, made by boiling down some of the dogs' sinews, strengthened with a little pemmican. The acute enjoyment of eating under these circumstances compensates in a slight measure for the suffering of starvation.

January 17 was another day of overcast weather and falling snow. Delay meant a reduction in the ration which was low enough already, so there was nothing to do but go on.

When I got away at 8 A.M. I found that the pulling was easier than it had been on the previous day. Nevertheless I covered only two miles and had to consider myself fortunate in not winding up the whole story then and there. This is what happened, following the account in my diary :

“Going up a long, fairly steep slope, deeply covered with soft snow, broke through lid of crevasse but caught myself at thighs, got out, turned fifty yards to the north, then attempted to cross trend of crevasse, there being no indication of it; a few moments later found myself dangling fourteen feet below on end of rope in crevasse—sledge creeping to mouth—had time to say to myself, ‘so this is the end,’ expecting the sledge every moment to crash on my head and all to go to the unseen bottom—then thought of the food uneaten on the sledge; but as the sledge pulled up without letting me down, thought of Providence giving me another chance.” The chance was very small considering my weak condition. The width of the crevasse was about six feet, so I hung freely in space, turning slowly round.

A great effort brought a knot in the rope within my

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grasp, and, after a moment's rest, I was able to draw myself up and reach another, and, at length, hauled myself on to the overhanging snow-lid into which the rope had cut. Then, when I was carefully climbing out on to the surface, a further section of the lid gave way, precipitating me once more to the full length of the rope.

Exhausted, weak and chilled (for my hands were bare and pounds of snow had got inside my clothing) I hung with the firm conviction that all was over except the passing. Below was a black chasm; it would be but the work of a moment to slip from the harness, then all the pain and toil would be over. It was a rare situation, a rare temptation—a chance to quit small things for great—to pass from the petty exploration of a planet to the contemplation of vaster worlds beyond. But there was all eternity for the last and, at its longest, the present would be but short. I felt better for the thought.

My strength was fast ebbing; in a few minutes it would be too late. It was the occasion for a supreme attempt. New power seemed to come as I addressed myself to one last tremendous effort. The struggle occupied some time, but by a miracle I rose slowly to the surface. This time I emerged feet first, still holding on to the rope, and pushed myself out, extended at full length, on the snow—on solid ground. Then came the reaction, and I could do nothing for quite an hour.

The tent was erected in slow stages and I then had a little food. Later on I lay in the sleeping-bag, thinking things over. It was a time when the mood of the Persian philosopher appealed to me :

Unborn To-morrow and dead Yesterday,
Why fret about them if To-day be sweet ?

I was confronted with this problem: whether it was better to enjoy life for a few days, sleeping and eating my fill until the provisions gave out, or to "plug on" again in hunger with the prospect of plunging at any moment

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into eternity without the great luxury and pleasure of the food. And then an idea presented itself which greatly improved my prospects. It was to construct a ladder from alpine rope; one end of which was to be secured to the bow of the sledge and the other carried over my left shoulder and loosely attached to the sledge harness. Thus, if I fell into a crevasse again, it would be easy for me, even though weakened by starvation, to scramble out again by the ladder, provided the sledge was not also engulfed.

Notwithstanding the possibilities of the rope ladder, I could not sleep properly at all; my nerves had been so over-taxed. All night considerable wind and drift continued.

On the 19th it was overcast and light snow was falling. I resolved "to go ahead and leave the rest to Providence."

As they wallowed through the deep snow my feet and legs kept breaking through into space. Then I went right under, but the sledge was held back and the ladder "proved trumps." A few minutes later I was down again, but I emerged again without much exertion, half-smothered with snow. Faintness overcame me and I stopped to camp, though only a short distance had been covered.

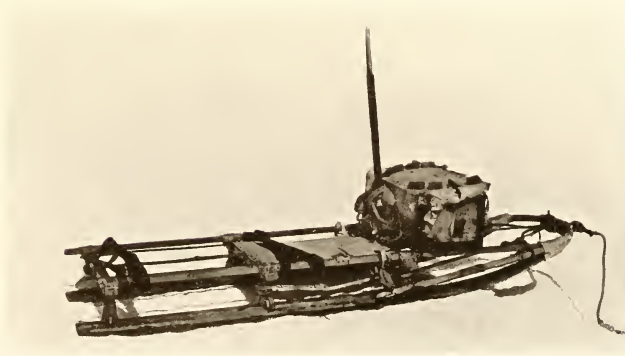
All around was a leaden glare, the snow-clouds "coralling" me in. The sun had not shown up for some days and I was eager to see it once more, not only that it might show up the landscape but for its cheerful influence and life-giving energy. A few days previously my condition had been improving, but now it was going back.

During the night of the 18th loud booming noises, sharp cracks and muffled growls issued from the neighbouring crevasses and kept waking me up. At times one could feel a vibration accompanying the growling sounds, and I concluded that the ice was in rapid motion.

The sun at last appeared on the 19th, and I was off by 8.30 A.M. The whole surface was a network of crevasses, some very wide. Along one after another of these I dragged the sledge until a spot was reached where the snow-bridge



MAWSON EMERGING FROM HIS MAKESHIFT TENT



THE HALF-SLEDGE USED IN THE LAST STAGE OF MAWSON'S JOURNEY

Hurley



“ . . . THE LONG JOURNEY WAS AT AN END—A TERRIBLE CHAPTER OF MY LIFE WAS FINISHED!”

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looked to be firm. Here I plunged across, risking the consequences.

After three hours' marching nothing serious had happened and I found myself on safer ground with a "pimply" surface visible ahead, close under the slopes of the highlands. Once on this I became over-reliant, and in consequence sank several times into narrow fissures.

At 1 P.M. the Mertz Glacier was at last crossed and I had reached the rising hills on its western side. Overlooking the camp, five hundred feet above the glacier, were beetling, crevassed crags, but I could trace out a good road, free from pitfalls, leading to the plateau, at an elevation of three thousand feet.

To lighten my load for the climb I threw away alpine rope, finnesko crampons, sundry pairs of worn crampons and socks, while I rubbed a composition on the sledge-runners which prevented them from sticking to wet snow.

January 20 was a wretched day; overcast, with wind and light drift. In desperation I got away at 2 P.M. in a wind which proved to be of considerable assistance. I could see nothing of my surroundings; one thing was certain, and that was that the ascent had commenced and every foot took me upward. The day's work amounted to about two and a half miles.

On the 21st the sun shone brightly and there was a good following wind. Through deep snow I zigzagged up for three miles before deciding to camp.

Wind and drift prevailed early on the 22nd but fell away towards noon, and I was then favoured with a glorious sunny day. Away to the north was a splendid view of the open sea; it looked so beautiful and friendly that I longed to be down near it. Six miles had been covered during the day, but I felt very weak towards the end on account of the heavy pulling.

During the early hours of the 23rd the sun was visible, but about 8 A.M. the clouds sagged low, the wind rose and everything became blotted out in a swirl of driving snow.

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I wandered on through it for several hours, the sledge capsizing at times owing to the strength of the wind. It was not possible to keep an accurate course, for even the wind changed direction as the day wore on. Underfoot there was soft snow which I found comfortable for my sore feet, but which made the sledge drag heavily at times.

When camp was pitched at 4 P.M. I reckoned that the distance covered in a straight line had been three and a half miles.

Erecting the tent single-handed in the high wind was a task which required much patience and some skill. The poles were erected first and then the tent was gathered up in the proper form and taken to the windward side of the legs where it was weighted down. The flounce on the windward side was got into position and piled up with snow blocks. Other blocks of snow had previously been placed in a ring round the legs in readiness to be tumbled on to the rest of the flounce when the tent was quickly slipped over the apex of the poles. In very windy weather it was often as much as two hours after halting before I would be cosy within the shelter of the tent.

High wind and dense driving snow persisted throughout the 24th and I made five and a half miles, sitting on the sledge most of the time with the sail up.

The blizzard continued on the 25th, but after the trying experience of the previous two days, I did not feel well enough to go on. Outside, the snow fell in "torrents," piled up round the tent and pressed in until it was no bigger than a coffin, of which it reminded me.

I passed most of the day doctoring myself, attending to raw and inflamed places. Tufts of my beard and hair came out, and the snowy floor of the tent was strewn with it at every camp.

"*January 26.*—I went on again in dense, driving snow. There was no need of the sail. The wind, which was behind, caught the sledge and bundled it along so that, though over a soft surface of snow, the travelling was rapid. The snow

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was in large, rounded grains, and beat on the tent like hail. Altogether nine miles were covered.

“*January 27.*—Blizzard-bound again. The previous day’s exertions were too much for me to undertake the same again without a long rest.

“*January 28.*—In the morning the wind had moderated very much but the sky remained overcast and snow continued to fall. It was a long job digging the tent out. Soon after the start the sun gleamed and the weather improved. The three-thousand-foot crest of the plateau had been crossed and I was bearing down rapidly on Commonwealth Bay, the vicinity of which showed up as a darker patch on the clouds of the north-west horizon.

“The evening was fine and I really began to feel that Winter Quarters were approaching. To increase my excitement Madigan Nunatak came into view for a time in the clear, evening light. Distance covered, over eight miles.”

The calm of the previous evening was broken again, and I started on the morning of *January 29* in considerable drift and a fairly strong wind. After going five miles I had miraculous good fortune.

I was travelling along on an even down grade and was wondering how long the two pounds of food which remained would last, when something dark loomed through the drift a short distance away to the right. All sorts of possibilities fled through my mind as I headed the sledge for it. The unexpected happened—it was a cairn of snow erected by McLean, Hodgeman and Hurley, who had been out searching for us. On the top of the mound was a bag of food, left on the chance that it might be picked up, while in a tin was a note stating the bearing and distance of the mound from Aladdin’s Cave (E. 30° S., distance twenty-three miles), that the Ship had arrived at the Hut and was waiting, that Amundsen had reached the Pole, and that Scott was remaining another year in Antarctica.

It was rather a singular fact that the search party only

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left this mound at eight o'clock on the morning of that very day (January 29). It was about 2 P.M. when I found it. Thus, during the night of the 28th, our camps had been only about five miles apart.

With plenty of food, I speedily felt stimulated and revived, and anticipated reaching the Hut in a day or two, for there was then not more than twenty-three miles to cover. Alas, however, there was to be another delay. I was without crampons—they had been thrown away on the western side of Mertz Glacier—and in the strong wind was not able to stand up on the slippery ice of the coastal slopes. The result was that I sat on the sledge and ran along with the wind, nibbling at the food as I went. The sledge made so much leeway that near the end of the day, after fourteen miles, I reckoned that I had been carried to the east of Aladdin's Cave. The course was therefore changed to the west, but the wind came down almost broadside-on to the sledge, and it was swept away. The only thing to do was to camp.

On the 30th I cut up the box of the theodolite and into two pieces of wood stuck as many screws and tacks as I could procure from the sledge-meter. In the repair-bag there were still a few ice-nails which at this time were of great use. Late in the day the wind fell off, and I started westward over the ice-slopes with the pieces of nail-studded wood lashed to my feet.

After six miles these improvised crampons broke up, and the increasing wind got me into difficulties. Finally, the sledge slipped sideways into a narrow crevasse and was caught by the boom (which crossed from side to side at the lower part of the mast). I was not strong enough for the job of extricating it straight away, and by the time I had got it safely on the ice, the wind had increased still more. So I pitched camp.

The blizzard was in full career on January 31 and I spent all day and until late at night trying to make the crampons serviceable, but without success.

TOIL AND TRIBULATION

On February 1 the wind and drift subsided late in the afternoon, and I clearly saw to the west the beacon which marked Aladdin's Cave.

At 7 P.M. I reached this haven within the ice, and never again was I to have the ordeal of pitching the tent. Inside the cave were three oranges and a pineapple which had been brought from the Ship. It was wonderful once more to be in the land of such things!

I waited to mend one of the crampons and then started off for the Hut; but a blizzard had commenced. To descend the five miles of steep icy slopes with my miserable crampons, in the weak state in which I found myself, would only have been as a last resort. So I camped in the comfortable cave and hoped for better weather next day.

The high wind, rising to a hurricane at times, continued for a whole week with dense drift until the 8th. I spent the long hours making crampons of a new pattern, eating and sleeping. Eventually I became so anxious that I used to sit outside the cave for long spells, watching for a lull in the wind.

At length I resolved to go down in the blizzard, sitting on the sledge as long as possible, blown along by the wind. I was making preparations for a start when the wind suddenly decreased and my opportunity had come.

In a couple of hours I was within one mile and a half of the Hut. There was no sign of the Ship lying in the offing, but I comforted myself with the thought that she might be still at the anchorage and have swung inshore so as to be hidden by the ice-cliffs, or on the other hand that Captain Davis might have been along the coast to the east searching there.

But even as I gazed about seeking for a clue, a speck on the north-west horizon caught my eye and my hopes went down. It looked like a distant ship; it might well have been the *Aurora*. Well, what matter! the long journey was at an end—a terrible chapter of my life was finished!

THE HOME OF THE BLIZZARD

Then the rocks around Winter Quarters began to come into view, part of the basin of the boat harbour appeared, and lo! there were human figures! They almost seemed unreal—I was in a dream—but after a brief moment one of them saw me and waved an arm, I replied, there was a commotion and they all ran towards the Hut. Then they were lost, for the crest of the first steep slope hid them. It almost seemed to me that they had run away to hide.

Minutes passed, and I slowly went along with the sledge. Then a head rose over the brow of the hill and there was Bickerton, breathless after a long run. I expect he considered for a while which one of us it was. Soon we had shaken hands and he knew all in a few brief words, and I learned that the Ship had left earlier in the day. Madigan, McLean, Bage and Hodgeman arrived, and then a newcomer—Jeffryes. Five men had remained behind to make a search for our party, and Jeffryes was a new wireless operator brought down by Captain Davis.

We were soon at the Hut where I found that full preparations had been made for wintering a second year. The weather was calm and the Ship was no distance away so I decided to recall her by wireless. The masts at the Hut had been re-erected during the summer, and on board the *Aurora* Hannam was provided with a wireless receiving set. Jeffryes had arranged with Hannam to call up at 8, 9 and 10 P.M. for several evenings while the *Aurora* was "within range" in case there were any news of my party. A message recalling the Ship was therefore sent off and repeated at frequent intervals till past midnight.

Next morning there was a forty-mile wind when we went outside, but away across Commonwealth Bay to the west the *Aurora* could be seen close to the face of the ice-cliffs. She had returned in response to the call and was steaming up and down, waiting for the wind to moderate. We immediately set to work getting all the records, instruments and personal gear ready to be taken down

TOIL AND TRIBULATION

to the boat harbour in anticipation of calm weather during the day.

The wind chose to continue and towards evening was in the sixties, while the barometer fell. During the afternoon Hodgeman went across to the western ridge and saw that the Ship was still in the Bay. The sea was so heavy that the motor-boat could never have lived through it.

That night Jeffryes sent another message, which we learned afterwards was not received, in which Captain Davis was given the option of remaining until calm weather supervened or of leaving at once for the Western Base. I felt that the decision should be left to him, as he could appreciate exactly the situation of the Western Base and what the Ship could be expected to do amid the ice at that season of the year. The time was already past when, according to my written instructions left for him on arrival at Commonwealth Bay, the *Aurora* should sail west to relieve Wild and his party.

On the morning of the 10th there was no sign of the Ship and evidently Captain Davis had decided to wait no longer, knowing that further delay would endanger the chances of picking up the eight men who had elected to winter on the shelf-ice one thousand five hundred miles to the west. At such a critical moment determination, fearless and swift, was necessary, and, in coming to his momentous decision, Captain Davis acted well and for the best interests of the Expedition.

A long voyage lay before the *Aurora* through many miles of ice-strewn sea, swept by intermittent blizzards and shrouded now in midnight darkness. We still fostered the hope that the vessel's coal-supply would be sufficient for her to return to Adelie Land and make an attempt to pick us up. But it was not to be.

The long Antarctic winter was fast approaching and we turned to meet it with resolution, knowing that if the *Aurora* failed us in early March, that the early summer of the same year would bring relief.

CHAPTER XIV

THE QUEST OF THE SOUTH MAGNETIC POLE

By R. BAGE

Send me your strongest, those who never fail.
I'm the Blizzard, King of the Southern Trail!

Sledging Song.

ON the afternoon of November 10, at Aladdin's Cave, after a convivial hoosh, Webb, Hurley and I said good-bye to Dr. Mawson's party and made off south for the eleven and three-quarter mile cave where our Supporting Party, Murphy, Hunter and Laseron, were waiting for us. At 7 P.M. we started almost at a run over the smooth ice, to the accompaniment of hearty cheers from Dr. Mawson, Ninnis, and Mertz; two of whom we were never to see again.

Half a mile of this easy going, and we were on snow for the first time with a loaded sledge. Uphill snow, too, and the wind rising, so it was no small relief when we finally made the Cathedral Grotto at 11.30 P.M., and found Murphy's tent pitched alongside it. The wind by this time was about forty-five miles per hour and, it being nearly dusk, the crevasses—a five-mile belt—had been fairly difficult to negotiate.

We soon had the cave clear of snow, had a good meal and then slept the sleep of the just, feeling well content with the first day's work—eleven and a half miles from home at an altitude of one thousand nine hundred feet. We were off at last on a search for the Magnetic Pole.

On the morrow some time was spent in rearranging the loads. Finally, both parties moved off south into heavy



Adelie Land THE SOUTHERN SUPPORTING PARTY ON THE PLATEAU. HUNTER, MURPHY AND LASERON *Hurdley*



Adelie Land

THE SOUTHERN AND SUPPORTING PARTIES BUILDING A DEPOT ON THE PLATEAU

Hurley

THE SOUTH MAGNETIC POLE

wind and fairly thick drift. What with the ground rising steadily, the pressure of the wind and our lack of condition, two and a quarter hours of solid work realized only two and a quarter miles ; so we decided to camp.

All the night it blew hard, between seventy and eighty miles per hour, and next day it was still blowing and drifting heavily. Our tent was a good deal smaller than Murphy's, and, as Webb and Hurley are both six-footers, we always had to put all gear outside when the sleeping-bags were down. This is really a good thing when the weather is bad, as one is not tempted to stay in the bag all the time.

Early in the afternoon as we were all feeling hungry and had been in bags long enough to feel cold, although the weather was quite warm (10°F.), we rolled bags, and, when our frozen burreberrys were once fairly on, quite enjoyed ourselves. After a boil-up and a few minutes' "run" round in the drift and wind, we did some stitching on our light drill tent, which was making very heavy weather of it, although pitched close under the lee of Murphy's strong japara tent. A little reading, some shouted unintelligible conversation with the other tent, another boil-up, and, last but not least, a smoke, found us quite ready for another sleep.

Next day (November 13), the wind having dropped to thirty-five miles per hour, we set out about 11 A.M. in light drift. The sky was still overcast, so the light was very trying. In the worst fogs at home one can at any rate see something of the ground on which one is treading ; in Adelie Land, even when the air was clear of snow, it was easy to bump against a four-foot sastruga without seeing it. It always reminded me most of a fog at sea : a ship creeping "o'er the hueless, viewless deep."

When 6 P.M. arrived we had only covered five and a half miles, but were all thoroughly exhausted and glad to camp. Lunch had been rather barbarously served in the lee of the sledge. First came plasmon biscuit, broken with the ice-axe into pieces small enough to go

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into the mouth through the funnel of a burberry helmet ; then followed two ounces of chocolate, frozen rather too hard to have a definite taste ; and finally a luscious morsel—two ounces of butter, lovingly thawed-out in the mouth to get the full flavour. Lunches like these in wind and drift are uncomfortable enough for every one to be eager to start again as soon as possible.

By nine o'clock that night the wind had increased to a full gale. We were in camp all the 14th and the 15th, the wind rising to eighty-five miles per hour with very heavy drift during the small hours of the 15th. This was its maximum, and by the afternoon it was down to about seventy miles per hour with a clear sky and light drift. We donned our burberrys (I should like to give Hurley's "Ode to a Frozen Burberry") and dug out our sledges, both of which were completely buried in a ramp forty yards long ; the shovel projecting nine inches above the surface.

While we were engaged on this work, I overheard the following conversation being shouted in the Supporting Party's tent :

FIRST VOICE. I'm hungry. Who will go out and get the food-bag ?

SLEEPY VOICE. The food-weights * are in the cooker.

FIRST VOICE. No they're not.

SLEEPY VOICE. Saw them there yesterday, must be somewhere in the tent.

FIRST VOICE. No they're not . . . I ate them last night.

The exercise, a good hoosh and above all the clear sky made us take a less morbid view of the fact that we were six days out from the Hut and only nineteen and a half miles away.

Early on the 16th we could hear above the roar of the wind the drift still hissing against the tent, but it had diminished by nine o'clock breakfast.

* Until amounts were known by experience, rations were weighed by a small balance whose various weights were small calico bags filled with chocolate.

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By common consent it was agreed that our loads were too heavy for the conditions under which we were working. I accordingly decided to drop one hundred-pound bag. We had already saved nearly one week's food for three men and had not yet worked up our full sledging appetites. The bag was raised to the top of a six-foot snow mound, a thermograph being placed alongside. As we now seemed to be on plateau snow, I thought it wise to leave behind my heavy boots and Swiss crampons.

By 4 P.M. the wind had decreased to a light breeze. Work was very slow on a steeper up grade, and at six o'clock clouds came up quickly from the south-east and snow began to fall, so we camped at 7.30 P.M. thoroughly tired out. At twenty-four and a half miles the altitude was three thousand two hundred feet.

The snow was a false alarm. It ceased at 9 P.M. and the wind subsided to a dead calm!!

Good headway was being made against a strong breeze next day, when it was noticed that two gallons of kerosene were missing off the supporters' sledge. While Murphy and Laseron went back two miles to recover them, Webb secured a magnetic declination and I took sun observations for time and azimuth.

We were off early on the 18th and for the first time were able to appreciate the "scenery." Glorious sunshine overhead and all around brilliant snow, dappled by livid shadows; very different from the smooth, soft, white mantle usually attributed to the surface of Antarctica by those in the homeland. Here and there, indeed, were smooth patches which we called bowling-greens, but hard and slippery as polished marble, with much the same translucent appearance. Practically all the country, however, was a jumbled mass of small, hard sastrugi, averaging perhaps a foot in height, with an occasional gnarled old veteran twice as high. To either side the snow rolled away for miles. In front, we made our first acquaintance with the accursed next ridge, which is always ahead of you on the plateau.

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Generally we passed from one ridge to another so gradually that we could never say for certain just when we had topped one; still the next ridge was always there.

The weather had lately been colder with the increased altitude. The temperature in daily range varied from -10° F. to 9° F. It was so hot in the sun, on the 18th, that lunching inside the tent was unbearable. We preferred its shadow outside in the breeze.

Wearing a minimum of clothes, we marched along gaily during the afternoon. The country changed in a wonderful manner, the sastrugi gradually becoming smaller and finally disappearing. The surface was so soft that a bamboo would easily penetrate it for a foot. Evidently it was fairly old and laid down in calm weather, for excavations showed that it became more compact without any hard wind-swept layers marking successive snowfalls.

It was proved that we were commencing a descent of one thousand five hundred feet down the north side of a valley feeding the Mertz Glacier. In order to explain the surface, smooth and unruffled by any wind, the question arose as to whether it is possible that there is a cushion of dead air more or less permanently over the north side of this depression.

On the soft surface we were able to dispense with crampons. Hitherto, it had been impossible to haul over a slippery surface in finnesko. Now we felt as light as air and were vastly cheered when some one calculated that the six of us were saving I don't know how many thousand foot-pounds of work every mile. With a run of twelve miles we were forty-two miles from Winter Quarters.

Another splendid day on the 19th. We had lunch in a curious cup-shaped hollow, estimated to be two miles wide and one hundred and fifty feet deep. Webb obtained here an approximate dip of $88^{\circ}44'$,* a very promising increase from the Hut ($87^{\circ}27'$).

Snow-blindness had now begun to make itself felt for

* At the South Magnetic Pole the dip is 90° .

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the first time. I for one had my first experience of it that afternoon. During the halt at lunch I put on yellow goggles in place of the smoked ones I had been wearing, and in a quarter of an hour the change of colour had 'settled' my eyes for the time being.

The afternoon was very hot. The thermometer stood at 10° F. at 4 P.M., but the still air made it almost insupportable. By the time the load was hauled up out of the basin, we were streaming with perspiration.

Before halting, we sighted a dark, distant ridge, thirty miles away, and the course was corrected by its bearing. Our extravagant hopes of finding a permanently calm region had been dwindling for the last few miles, as a hard bottom, a few inches under the surface, had become evident. They were finally dispelled by a south-west wind springing up during the night.

As every one was beginning to feel the hard work after another oppressive afternoon on the 20th, we decided to have an easy march next day and to build our first depot. Of course we had hoped to have been farther out before sending back the supporting party, but the weather had settled the question.

On the 21st, taking things as easily as a thirty-five mile wind would permit, we pulled on, up and down small undulations till 4 P.M. when we encountered a small rise, with the next ridge a considerable distance ahead. The depot was to be built here.

Webb at once proceeded to take full magnetic declination, time and azimuth observations, Laseron recording for him. Murphy put in a miserable hour over the primus melting snow. He was rather snow-blind and his eyes must have contributed a good deal of water to the pot. The water was poured into food-bags filled with snow, which were buried, encircled by wire slings, in holes. Here they froze, making excellent holdfasts for the depot flag. Depot flags had been exercising our ingenuity for months before the start, ordinary forms being destroyed by the wind in a few

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hours. Webb had finally built the perfect flag of the wind-vane type : a V of pieces of blackened Venesta board with light struts at the back and a piece of aeroplane tubing at the apex which slipped over the bamboo pole. The pole, of two bamboos, stood sixteen feet from the ground and was provided with two sets of flexible steel stays. Close by, Hurley and Hunter had built a snow mound ten feet in diameter and ten feet in height, finished off with a capping of snow blocks wrapped in black bunting.

Next day it was blowing a little harder and the sky was overcast, snow falling all day. What bad light means can be gathered from the fact that Laseron on crawling out of the tent in the morning raised an alarm that our tent had been blown away in the night. It turned out that our tent was hidden by a mound which he could not see, though only about ten yards from it.

I had been given the option of relieving the supporting party of any of their gear I coveted and I used it freely. The sledge-meter was the first thing commandeered, ours, made by Correll, having developed some slight complaint in its interior. Their cooker, being in good condition, was also taken. We all cast longing eyes at the roomy wind-proof tent but finally decided that it was too heavy—forty pounds as against our own of twenty-six pounds, including tent and poles.

At 7 P.M. we said good-bye to our supporters, Hurley exposed the last plate of his big reflex camera, which they carried back to the Hut, and a few minutes later Webb, Hurley, and I were standing alone watching three black specks disappearing in the drift ; a stiff wind helping them along in great style. We were left to our own resources now, for better or for worse. "Weird" is how I described my feelings in the diary.

The same night it blew a hurricane and only dropped to sixty miles per hour during the 23rd, compelling us to remain in camp. Not an ideal birthday for Webb, but we made the most of it. I quote from my diary : "Turned

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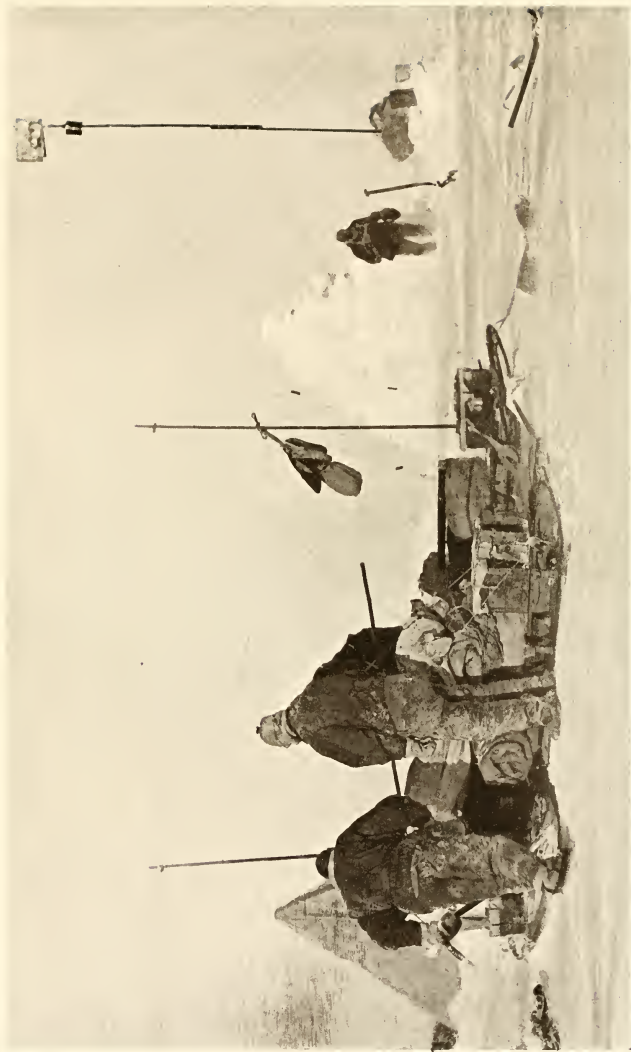
out and rolled bags at 3 P.M. for lunch, for which we opened a wee tin of bacon ration brought for the occasion. Had some extra lumps of sugar (collared from the eleven-mile cave) in our tea. After the wine had been round (*i.e.* after a special second cup of tea), I gave Eric a pair of stockings from Murphy, and then 'Hoyle' and I smoked a cigar each which Webb produced. Dinner at 7 was also a special affair as we had the remains of the bacon ration in the hoosh, with great effect. Also an extra strong brew of cocoa boiled quite smooth. Burberrys on and a stroll outside in the wind for a yard or two to get up a circulation; then into bag where I am smoking a plebeian pipe which is very tame after the glories of the day, especially as I suspect my tobacco of being a bit damp."

Such was the first of the two "auspicious occasions" we had on the journey.

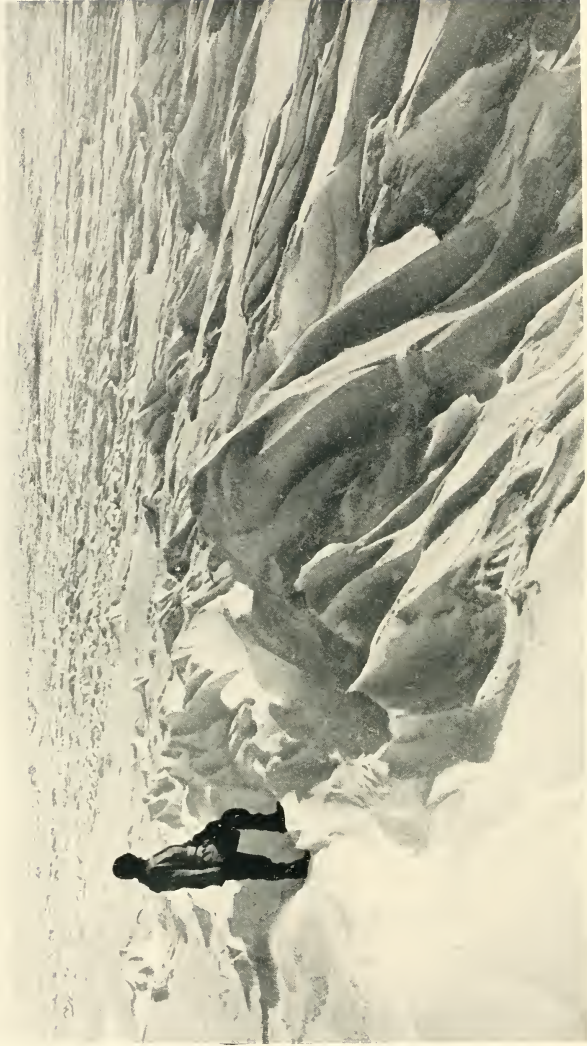
After going carefully through the gear, we discarded a pickaxe, one pair of big spiked boots and some odd clothing. We also decided, as the probability of leisure was not great, to leave our reading matter behind. It was with regret that I added my little *Virginibus Puerisque* to the small pile of "rejects." The load now amounted to seven hundred and forty-eight pounds in all. Not many days after, the floor-cloth (eight pounds) was left behind, as the japara sail afforded ample protection from damp in the low temperatures of the plateau.

The dip-circle, which was to yield the most important result of our journey, was housed after much thought on a conveniently shaped kerosene tray between the tins of oil. Four light leather straps, buckled tightly, made a solid mass of tray, oil tins, and dip-circle; very safe, and easy to undo.

My orders were to proceed inland, due south, taking magnetic, geographical, meteorological, and such other observations as were possible, returning to the Hut not later than January 15. Dr. Mawson had left it to my discretion, in the event of any great change occurring in the declination, to go either true or magnetic south.



Harbor
DEPOT MADE BY THE SOUTHERN AND SUPPORTING PARTIES AT A POINT 67 MILES SOUTH OF COMMONWEALTH BAY. MURPHY.
LASERON AND HUNTER PACKING SLEDGE IN THE FOREGROUND; BAGE IN THE DISTANCE



King George V Land

A ROUGH SLEDGING SURFACE OF HIGH SASTRUGI ENCOUNTERED BY THE SOUTHERN PARTY 200 MILES SOUTH-SOUTH-EAST OF THE HUT

Hickey

THE SOUTH MAGNETIC POLE

At the Hut and up to about sixty miles south of it, the declination had proved fairly constant, but now at the Southern Cross Depot, as we had christened the sixty-seven-mile camp, the compass, from pointing a little to the east of south, had travelled to 40° east of south, so that it became obvious that there was considerable magnetic disturbance in the country over which we were travelling. Whether we went south or south-east seemed unlikely to affect the value of geographical and other information we might gather, while Webb was of the opinion that the best magnetic results would be obtained by marching directly towards the Magnetic Pole, particularly if there were disturbances over the intervening area. For these reasons the course was maintained magnetic south.

At 11 A.M. on Sunday, November 24, we moved off to the south-east in a wind of fifty miles an hour. The light was bad, and steering had to be done by sastrugi and wind. However, momentary glimpses of the sun served to check the course. The lunch camp was five miles from the depot, and a good mound with a top of black bunting was left there. At almost every halt, thus far on our journey, the snow cut for pitching the tent had been gathered up into a mound which, in addition to forming a landmark, could often be used as a back-mark for checking the course. Our depot thus had a mound four miles on the southern and five miles on the northern side of it. It was not marked as well as I had hoped, but under the circumstances we could not do better. Moreover, at intervals during the day, some very distinctive snow ramps had appeared in the valley, some five miles to the north-east, and their position was fixed relative to the course.

Our hopes for a good afternoon were disappointed, as the wind and drift came up again as strong as ever. The surface, too, grew worse; nothing but sastrugi eighteen inches to thirty inches high and very close together. We were marching a little to the east of the wind, and the sledge was continually blown sideways, making considerable

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leeway. By 8.30 p.m. it was blowing sixty miles per hour, so we halted, thoroughly tired out, having hauled our one-third of a ton eight and three-quarter miles.

When it is blowing hard, the end of the day's march is not the end of the day's work. As soon as a camping spot has been chosen, the sledge is pulled round head to wind. The straps round the load are loosened carefully, the shovel and tent removed and the straps retightened. One man starts breaking out chunks of snow, experimenting until he finds a place where large pieces come away readily. Lumps of forty pounds are the handiest and quickest, but often only smaller ones can be obtained. These are arranged in a circle round the tent-site, while the man with the tent places it on the ground pointing upwind, the bottom of the poles being just where the middle windward leg will be, and makes a hole for that leg.

When everything is ready, all three catch hold of the tent, one man crawling half into it, gripping hard the leather loop on the windward leg. The others sort out and grip their two side legs. "All ready? Up!" It almost takes one's breath away, the roar and the flap! The side legs are quickly separated as the tent rises, and before it can blow over, the leeward legs are more or less in position, taking the strain. The centre man is throwing all his weight on to the leather loop, while the other two outside each holds down his windward pole with one hand and with the other pulls blocks of snow on to the skirt to windward. Once this is done, the rest is simple: cutting holes in just the right positions for the other legs, pulling out the skirt and making it snug all round. Then in goes the floor-cloth, and, by the time that is spread out properly, the primus and cooker are passed in. The cooker is dissected and the two water vessels passed out to be filled with snow. The cook will have hard work to get the primus started if he does not shield the spirit flame from the wind, which blows through the tent, by putting the whole lamp inside the big cooker lid.

In come the pots filled with lumps of snow. The food-

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tank is placed just outside the entrance, and the proper food-bags for the meal are passed in to the cook, the tank being retied to keep out drift. The cooker will now be going at full pressure, and the cook is ready to receive the gear. Sleeping-bags, "computation bag," hypsometer, "meat block" (a three-inch-square paper pad on which meteorological notes were taken); clothes-bag opened, three ditty-bags passed in and bag retied; a final temperature taken and aneroid read; sledge anchored securely by tow-rope to the ice-axe, and a final look round to see all gear is safely strapped down and snow-tight.

In calm weather, camping is a very different thing. On a fine day, half an hour after the halt would usually find us carefully scraping the last of the hoosh out of our pannikins, ready for the cocoa.

At the seventy-six-mile camp we tried the experiment of a break-wind. The tent was so small and light that it was necessary to protect it in the heavy winds. Hurley and I took about three-quarters of an hour to build the first one, but later we improved, getting into the knack of hewing snow with a sharp-pointed shovel.

That night in bag I wrote: "The result of the break-wind is that for once we have the wind bluffed. It is blowing seventy-five miles per hour—a full hurricane—but all the viciousness is taken out of the flapping and there will be no damage done to the tent by morning."

The wind was too strong for travelling early in the day (November 25). While outside we suddenly observed two snow petrels. It was hard to realize that they had actually flown seventy-six miles inland to a height of two thousand four hundred and fifty feet. I dashed inside for the fishing-line; Hurley got out the camera. They were a beautiful sight, hovering with outspread wings just above the snow, tipping it with their feet now and then, to poise without a flutter in a sixty-five-mile gale. Hurley secured a couple of "snaps" at the expense of badly frost-bitten hands. Just as I arrived with the line hooked and baited, the birds flew

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away to the north-east ; our visions of fresh meat went with them. The line was always ready after this.

Towards evening the wind dropped suddenly to twenty miles per hour. Our camp was stationed on the southern side of the large valley we had entered on the 18th, and we could identify the ridge crossed on that date, blue and djm, forty miles away to the north. To the north-east could be seen a distinct dip in the skyline, indicating the bed of the valley, on whose northern side the dip met the higher skyline in a steep bluff, twenty-five miles off. This bluff under the glasses was of heavily crevassed, blue ice.

The wind did not rise again much until 10 P.M., when we had moved on seven and a half miles, rising about three hundred feet over several ridges and practically losing our view to the north.

A steady breeze on the 26th, and, on the whole, good light, allowed us to make twelve miles.

Each day, now, Webb took an approximate magnetic dip and declination in the lee of the break-wind. This was necessary in order to get some idea of local disturbances. Also, it gave us some vague idea as to the direction in which lay the South Magnetic Pole. For instance, at the eighty-three-and-three-quarter-mile camp, the needle showed the Pole to be 18° east of true south, while at our lunch camp that day, six miles farther on, it was given as 50° east of south. The dip was so great that our prismatic compass would not set closer than about 15° , but the long compass needle of the dip-circle, though of course sluggish, continued to give excellent results.

Under these conditions it is obvious that the magnetic needle is quite useless for steering purposes. The sun compass proved itself a more than efficient substitute. On a snow-field there is usually a total absence of landmarks of any kind, so the direction of wind, sastrugi, or perhaps a low cloud is found with the sun-compass, frequently checked, and the course kept accordingly. On camping we would generally carefully note the direction in which the sledge was

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left, in case the next day proved overcast. Thus we would march in the morning by the wind's direction till the sun, gleaming through the clouds for a few moments, enabled us to use the compass again.

Sastrugi, only six inches high, seen on the 26th, showed the effects of wind-erosion exquisitely. In an individual case the windward end of a sastruga might be completely undercut for six or nine inches, leaving a hard crust, sometimes only one-eighth of an inch in thickness and a couple of inches wide. This would sag downwards under its own weight in a fine curve till the tip rested on the snow beneath. It is marvellous how such a delicate structure can withstand the heavy wind.

November 27 proved a very hard day. The wind kept up sixty miles per hour all the time, so that, after taking four hours to do four and three-quarter miles, we were all thoroughly exhausted. It was not a great run, but the century was hoisted—one hundred and three-quarter miles by sledge-meter; altitude two thousand nine hundred feet. There was a mild celebration that night over a square of butter-scotch and half an ounce of chocolate, besides the regular hoosh and cocoa.

Next day the light was very bad and the wind fifty miles per hour. Observations were therefore made inside the tent. Webb, Hurley and the instrument occupied all available space, while I spent three hours digging a shaft eight feet deep in the snow, taking temperatures every foot. It appeared that the mean annual temperature of the snow was approximately -16° F.

The dip was $88^{\circ} 54'$; certainly rather too large a rise from $88^{\circ} 20'$ of twenty miles back. The declination had actually changed about 80° in the last ten miles. This one-hundred-mile station was badly disturbed. From the evidence, it is possible that a subsidiary "pole" or area of almost vertical dip may exist close by this spot to the west or south-west.

Going straight up wind into a "blow" which varied from

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forty to fifty miles per hour, we were able to make eight miles after the previous day's rest. At lunch a hole was dug five feet square and two feet deep. It served three purposes. First, it gave a good shelter for a longitude observation; secondly, with the mast, yard and floor-cloth we converted it into a shelter snug enough to house the primus and to lunch comfortably; and thirdly, a mound was left as a back-mark which was picked up on the return journey.

By experience we found that a warm lunch and a rest enabled one to "peg" along a good deal farther than would otherwise be possible.

The "scenery" in the afternoon became if possible more desolate—very few new sastrugi, the surface appearing generally old and pitted. In some places it was rotten and blown away, disclosing coarse granulated substrata. At the top of one ridge the snow merged into névé split into small crevasses, nine inches wide and four or five yards apart. The camp was pitched, here, at 11 P.M. The latitude was 68° 32' S., and we saw the midnight sun for the first time that summer, about one-quarter of its rim remaining above the horizon.

A full hurricane came up and kept between fifty and sixty miles per hour all day on the 30th. Before moving off, Webb found that the magnetic needle had "waltzed" back 60° since the one-hundred-mile camp, now pointing 30° east of south. Still, to allow the needle to make up its mind, we steered into the wind at 2 P.M., losing the névé and meeting very rough country. By 6 P.M., with four miles to our credit, we were nearly played out. It was being discussed whether we should go on when the discovery was made that the theodolite legs were missing; probably having slipped out in one of the numerous capsizes of the sledge.

The solemn rites of "shut-eye" determined that Webb was to stay and make camp while Hurley and I retraced our steps. It was no easy matter to follow the trail, for on

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hard snow the sledge runners leave no mark, and we had to watch for the holes of the crampon spikes. About two and a half miles back, the legs were found, and there only remained a hard "plug" against the wind to camp and hoosh.

While we were lying half-toggled into the sleeping-bags, writing our diaries, Hurley spent some time alternately imprecating the wind and invoking it for a calm next day. As he said, once behind a break-wind one could safely defy it, but on the march one is much more humble.

Whether it was in honour of Queen Alexandra's birthday, or whether Hurley's pious efforts of the evening before had taken effect, December 1 turned out a good day. By noon, the wind had dropped sufficiently for us to hoist the Jack and Commonwealth Ensign for the occasion.

After four miles of battling, there came into sight a distinct ridge, ten miles to the west and south—quite the most definitely rising ground observed since leaving the coast. In one place was a patch of immense crevasses, easily visible to the naked eye; in another, due south, were black shadows, and towards these the course was pointed.

At a point more than one hundred and twenty-five miles from the sea, a skua gull paid an afternoon call, alighting a few yards from the track. I immediately commenced to stalk it with a fishing-line, this time all ready and baited with pemmican. However, it was quite contemptuous, flying off to the south-south-east as far as we could follow it. Was it taking a short cut to the Ross Sea?

December 2 saw us through "Dead-Beat Gully" to a rise, in sight of the shadows towards which we had been steering. Two miles away they appeared like the edge of the moon seen through a large telescope. The shadows were due to large mounds of snow on the south side of a steep escarpment. Three main prominences were cross-connected with regular lines of hillocks, giving the impression of a subdivided town-site. The low evening sun threw everything up in the most wonderful relief.

On the morning of the 3rd we were in a valley running

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west-north-west and east-south-east. The southern side rose steeply and from it projected three large mounds, about two hundred feet from the bottom of the valley, into which they fell just like tailings-heaps from a mine. They were christened "The Nodules."

Going due south uphill over névé we found ourselves in a regular network of crevasses. They were about ten feet wide and well bridged. Most noticeable were "hedges" of ice up to six feet in height on either side of the crevasses which ran southward. It was now nearly calm and in every crack and chink in the snow-bridges beautiful fern-like ice-crystals were seen. These must have been just forming, as a very light puff of wind was seen to destroy many of them.

We spent three hours exploring the locality. On nearing the top of the ridge, roped together, we found that the crevasses were becoming much wider, while the "hedges" were disappearing. The centre "nodule" was found to be immediately north or to the leeward of the intersection of two crevasses, each about forty feet wide. The bridge of one crevasse had dropped some thirty feet for a length of eighty yards. Doubtless, an eddy from this hole accounts for the deposit of snow and, by accretions, for the erection of the nodule. Webb went down at the end of the alpine rope and found the bridge below quite solid.

For about half a mile the summit of the slope was practically level, three hundred feet above the bed of the valley. The surface was still of névé, intersected by canals forty, sixty and eighty feet wide, in which the snow-bridge was generally four or five feet from the brink.

On the south-west horizon, perhaps twenty miles away, was a salient crest streaked by three dark vertical bars; evidently another crevassed area.

Returning to the sledge, we toggled-on and worked it up over the top of the ridge, much regretting that time would not allow us to examine the other two large "nodules." Hurley was in the lead, lengthening his line by thirty feet of

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alpine rope, but even then all three of us and the sledge were often on the lid of a crevasse. Luckily, the lids were fairly sound, and none of us went in beyond the waist. Finally, the trail emerged on to ordinary sastrugi once more, where a halt was made for lunch. We were all glad to have seen the place, but I think none of us has any wish to see another like it.

That night, after following the magnetic needle towards the south-east, we were fairly on the plateau at one hundred and forty miles, with an altitude of four thousand four hundred feet. The dip, however, had steadily decreased, standing now at $88^{\circ} 30'$. There was some consolation in the hope that a big, sudden rise was stored up for us somewhere along the way ahead.

December 4 and 5 were fine days, giving only twenty-two miles, as we met with a rough surface; a large quantity of very hard, razor-backed sastrugi, generally about two feet high, like groined vaulting inverted, on a small scale. Sledge and sledge-meter both had a very rough passage. The sledge, for instance, balances itself on the top of a sastruga for a moment, with an ominous bend in the runners, crashes down the slope and jams its bow into the next one, from which it has to be lifted clear.

During this run the needle again misbehaved itself, changing its direction some 85° in ten miles, but by the night of the 5th we were getting past the disturbed locality and the dip had increased considerably.

For the first time on the trip the wind veered round to the south-east. Snow had fallen overnight (December 5) and had drifted in long ramps diagonally across the sastrugi. In two and a half hours we covered two and a quarter miles, blindly blundering in an uncertain light among crests and troughs and through piles of soft, new snow. Then we stopped; Webb filling in the afternoon with a full set of dip observations.

That night the break-wind played its one possible trick. Waking on the 8th, we found that the heavy snowfall, with

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only a moderate wind, had drifted us up. Of course Hurley and I, who slept on the 'outsides,' had known it most of the night. Before we could extricate ourselves from the bags Webb had to turn out from the middle to dig away the drift which was weighing down the walls of the tent on top of us.

It was hopeless weather for travelling. In the afternoon a snow cave was dug, seven feet deep and enlarged to seven feet square at the bottom. The whole was covered with mast, yard and sail. It was very snug from the outward aspect, but we soon found that there were two objections to the "Sarcophagus," as it was named. There was very little light except a ghastly blue half-tone filtering through the snow, and the place was not over warm, surrounded by walls at a much lower temperature than that of the surface.

Webb commenced a declination "quick-run," consisting of half-hourly observations of the direction in which the compass was pointing. In ordinary latitudes, during the day, the compass needle moves over a few minutes of arc, but here, being so close to the Magnetic Pole, its movement is greatly magnified, the range being about 5° on this occasion. Webb carried on readings till midnight, and at 4 A.M., December 9, I turned out, being relieved at 8 A.M. by Hurley, who carried on until the twenty-four hours were completed. This observation should be especially valuable when it is compared with continuous magnetic records obtained at the same time at Winter Quarters and by the Scott expedition at McMurdo Sound.

It was not till 1.30 P.M. on December 10 that the sixty-mile wind had subsided sufficiently for us to get away. Every yard of our quota of seven miles was hard going. A fine example of a typical old sastruga was passed on the way. In order to secure a photograph of it, Hurley had to waste eighteen films before he could persuade one to pull into place correctly. The film-packs had been carefully kept in an air-tight tin, but the cold was too much for them. The tags which should pull each film round from the back to the front of the pack usually tore away with a small piece of film.

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In fact, out of one hundred and twenty films only forty-five exposures were made.

On the 11th a good deal of "piecrust" cut down the day's march to eight and a half miles. Sledge runners are usually supported by this surface, but one's feet break through in a most annoying and tiring manner. The drift eased off for a few hours and we managed to dry some of our gear. At the Sarcophagus, things which had all been wet enough before became saturated with drift which turned to ice. Felt mitts are perhaps the worst in this respect, and it is no exaggeration to say that you could easily brain a man with one after it had been worn in drift for a couple of days.

That night I decided that one more day must see us at our depot. Allowing three days' grace for contingencies, there were thirty-one days for us to attain our farthest southerly point and back to the Hut.

On the 12th we planned to reach a spot for the depot, two hundred miles out, and by 11.30 P.M. came on a fine site at one hundred and ninety-nine and three-quarter miles; altitude four thousand eight hundred and fifty feet, latitude $69^{\circ} 33' 1''$ south; longitude $140^{\circ} 20'$ east. Everything possible was left behind, the sledge-decking being even cut away, until only three light bamboo slats remained. A pile, including ten days' food and one gallon of kerosene, was placed on a small mound to prevent it being drifted over. A few yards distant rose a solid nine-foot cairn surmounted by a black canvas-and-wire flag, six feet higher, well stayed with steel wire.

I took on food for seventeen days, three days more than I intended to be out, partly so that we could keep on longer if we found we could make very fast time, and also as a safeguard against thick weather when returning to the depot.

Late in the evening we set off against a stiff breeze. The sledge ran lightly for three and a half miles, and we camped. The depot showed up well in the north-west as a bright golden spot in the low midnight sun.

Next day the piecrust was so bad that, despite the

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lessened load, we only covered twelve miles. The surface was smoothly polished, and we either crashed through it from four inches to a foot or else slipped and came down heavily on knees, elbow, or head. New finnesko were largely responsible for such an accident.

At 11 P.M. a remarkable ramp, five chains long, was passed. On its windward side was a tangled cluster of large sastrugi. They made one imagine that the wind, infuriated at finding a block of snow impeding its progress, had run amok with a giant gouge, endeavouring to pare it down. Every now and then, the gouge, missing its aim, had taken great lateral scoops from the surface, leaving trenches two and three feet deep.

In bags that night we had a talk (not the first by any means) over our prospects. Up to the one hundred-and-seventy-four-mile camp, four hundred miles seemed dimly possible, but now we saw we would be lucky to reach three hundred miles. Moreover, the dip at this spot was $89^{\circ} 11'$, practically what it had been ever since one hundred and fifty miles. Sixty-five miles for nothing! How far for the other forty-nine minutes which were needed for a vertical dip and the South Magnetic Pole? This problem was insoluble, so each toggled himself into his bag in a rather depressed state of mind.

December 16 was a glorious day; only a fifteen-mile wind, and for ten miles an improved surface. There was no drift, consequently opportunity was taken to turn the sleeping bags inside out. They needed it, too. The upper parts were not so bad as they had been propped open occasionally, but the lower halves were coated with solid ice. For the first time for weeks we did not wear burberrys, as the weather was so warm. Fourteen miles was the total work, the previous day's being twelve.

All three of us were having trouble with snow-blindness; the "zinc and cocaine" tabloids being in great demand.

Latitude 70° south was passed on the 17th and we were another fourteen miles to the good. The dip was on the

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increase— $89^{\circ} 25'$ and the declination swung to 40° east of the magnetic meridian. At two hundred and fifty-six miles the altitude was five thousand five hundred feet.

The temperature was getting lower; the minimum being -21° F. on the night of the 17th, rising to a maximum of 3° F. on the following day.

There was dead calm and a regular heat wave on December 19. As the sun rose higher and higher, the tent became absolutely oppressive. The rime coating the walls inside thawed and water actually trickled into our finnesko. Usually we awoke to find them frozen hard, just as we had shaped them on the previous night, but on this particular morning they were pathetically limp and wet. The temperature inside the tent was 66° F., heated, of course, by the sun's rays which raised our black bulb thermometer to 105° F. We were not used to this sort of thing and struggled out hurriedly for a breath of fresh air.

Once into harness, we began to feel the effects of exertion. By degrees we got rid of our clothing, but unfortunately soon came to bedrock in that respect, as the underclothing was sewn on and immovable. At lunch time, with the thermometer at -2° F. in the shade, we reluctantly dressed knowing how soon we would cool off. About 9 p.m. clouds moved over rapidly from the south-east and the landscape faded into the blank, shadowless nothing of an overcast day. The camp was pitched at two hundred and eighty-three miles amidst a jumble of ramps and sastrugi. The dip had seen fit to rise to $89^{\circ} 35'$.

In the morning the wind was doing thirty miles per hour, which certainly seemed to be the normal thing. It fell to a nice sailing breeze, but, at the time, we were not very appreciative of anything as the course was uphill. Again, it was to be the last day's run, so we were "all out" when the halt came after a good fifteen miles—the longest day's march on the outward journey. Nevertheless, Webb unpacked the theodolite after hoosh and took an altitude of the sun at midnight.

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On December 21 the load on the sledge was stripped down to tent, dip-circle, theodolite, cooker and a little food. For two and a half miles we went south-east over rising ground until the sledge-meter showed three hundred and one miles.

While Hurley and I pitched the tent, Webb built a break-wind for his instrument fifty yards away. Then followed a long set of magnetic observations. About 5 P.M. the magnetic work was interrupted; the theodolite replacing the dip-circle on the legs, while I took a longitude shot. I was seeing double, being slightly snow-blind, and had some difficulty in choosing the correct combination from the assortment of suns and cross-wires visible in the telescope. Setting the vertical and horizontal wires simultaneously on the sun was beyond me; Webb taking the observations for the true meridian, which also checked my longitude shot.

Magnetic work under these conditions is an extremely uncomfortable operation. Even a light wind will eddy round the break-wind, and it is wind which makes low temperatures formidable. Nearly all the work has to be done with bare fingers or thin instrument-gloves, and the time taken is far greater than in temperate climates, owing to the fingers constantly "going" and because of the necessity of continually freeing the instrument from the condensed moisture of the breath. Considering that the temperature was -12° F. when he had finished his four hours' work, it may be imagined that Webb was ready for his hot tea. The dip proved to be $89^{\circ} 43' 5''$, that is, sixteen and a half minutes from the vertical. The altitude was just over five thousand nine hundred feet, in latitude $70^{\circ} 36' 5''$ south and longitude $148^{\circ} 10'$ east.

After lunch the Union Jack and the Commonwealth Ensign were hoisted and three cheers given for the King—willing but rather lonesome away out there! We searched the horizon with glasses but could see nothing save snow, undulating in endless sastrugi. To the south-east the horizon was limited by our old enemy, "the next ridge," some two miles away. We wondered what could be beyond,

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King George V Land

Hudley

FARTHEST SOUTH CAMP OF SOUTHERN PARTY, 17 "MINUTES" (ABOUT 50 MILES) FROM THE SOUTH MAGNETIC POLE. BAGE NEAR SLEDGE; WEBB TAKING SET OF MAGNETIC OBSERVATIONS, BEHIND "SNOW BARRICADE"



SASTRUGI FURROWED BY THE MIGHTY WINDS OF THE PLATEAU
250 MILES S.S.E. OF WINTER QUARTERS, ADELIE LAND



King George V Land

Hurley

UNDER REEFED SAIL. SOUTHERN PARTY 290 MILES S.S.E. OF WINTER
QUARTERS, ADELIE LAND

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although we knew it was only the same featureless repetition, since one hundred and seventy-five miles on the same course would bring us to the spot where David, Mawson and Mackay had stood in 1909.

After Hurley had taken a photograph of the camp, the tent was struck and the sledge repacked. At last the sail was rigged, we gave a final glance back and turned on the homeward trail.

My diary of that night sums up: "We have now been exactly six weeks on the tramp and somehow feel rather sad at turning back, even though it has not been quite a Sunday school picnic all along. It is a great disappointment not to see a dip of 90° , but the time is too short with this 'climate.' It was higher than we expected to get, after the unsatisfactory dips obtained near the two-hundred-mile depot. The rate of increase since that spot has been fairly uniform and indicates that 90° might be reached in another fifty to sixty miles, if the same rate held, and that means at least another week. It's no good thinking about it for 'orders are orders.' We'll have our work cut out to get back as it is. 'Twenty-five days till we are overdue. Certainly we have twenty-three days' food, eight days' with us, ten days' at two hundred miles, and five days' at sixty-seven miles, so with luck we should not go hungry, but Webb wants to get five more full sets of dips if possible on the way back, and this means two and a half days."

That night the minimum thermometer registered its lowest at -25° F. It was December 21 and Midsummer Day, so we concluded that the spot would be a very chilly one in the winter.

At this juncture we were very short of finnesko. The new ones we had worn since the two-hundred-mile camp had moulted badly and were now almost "bald." The stitching wears through as soon as the hair comes off and frequent mending is necessary.

We rose earlier than usual on the 22nd, so as to get more advantage from the wind, which each evening had

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always tended to die down somewhat. With forty-two square feet of sail, the twenty-mile wind was too much for us, the sledge capsizing on the smallest pretext. Instead of hanging the yard from the top of the mast, we placed it across the load, reversing the sail and hooking the clews over the top of the mast. Three or four pieces of lampwick at intervals served as reefing-points by which the area of the sail could be quickly cut down by bunching the upper part as much as was necessary.

During the day we frequently saw our tracks in patches of snow left during a previous snowfall, but they were much eroded, although only three days old. After sledging in Adelie Land it is hard to realize that on certain parts of the Ross Barrier tracks a year old may remain visible.

After passing the two-hundred-and-eighty-three-mile mound, the sledge-meter became very sickly. Spoke after spoke had parted and we saw that nothing we could do would make it last very much longer. As we intended in one place to make a cross-country run of seventy miles, so as to cut off the detour to the "Nodules," the meter was carried on the sledge. We had now the mounds to check distances.

On December 23 we were lucky enough to catch sight of the two-hundred-and-sixty-nine-mile mound and later the one at two hundred and sixty-one miles, though there was a good deal of drift. The day's run was twenty and a half miles.

A thing which helped us unexpectedly was that, now with the wind behind, we found it unnecessary to wear the stiff, heavy, frozen, burberry trousers. Thick pyjama trousers took their place in all except the worst weather.

At our old two-hundred-and-forty-nine-mile camp, Webb took a complete set of magnetic observations and another time-shot for watch-rate. It was late when these were over, so we did only two and a half miles more, halting for Christmas Eve, well content with a run of fourteen miles in addition to a set of observations.

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On Christmas Day the country was very rough, making sailing difficult. Still, eighteen and a half miles were left behind. The wind was practically along the sastrugi and the course was diagonal to both. As the sledge strikes each sastruga, it skids northwards along it to the discomfort of the wheelers and the disgust of the leader.

For Christmas dinner that night we had to content ourselves with revising the menu for the meal which was to celebrate the two-hundred-mile depot. But now it was all pretty well mapped out, having been matured in its finer details for several days on the march. Hors d'œuvre, soup, meat, pudding, sweets and wine were all designed, and estimates were out. Would we pick up the depot soon enough to justify an "auspicious occasion"?

Next day the wind was due south at thirty miles per hour. Dodging big ramps and overturning on sastrugi, at the same time dragging well upwind of the course to save leeway, twelve miles went by without the two-hundred-and-fifteen-mile mound coming into sight. Finally, a search with the glasses through falling snow revealed it a good two miles back. As we particularly wanted some photos of the ramps at this camp, we made across to it and had lunch there, Hurley exposing the last of the films.

At two hundred and nine miles "Lot's Wife" appeared—a tall, thin mound which Hurley had erected during a lunch-camp on the way out.

On the 27th, with a thirty-five-mile wind and a good deal of drift, we did not see the two-hundred-and-three-mile mound until we almost ran into it. By three o'clock the great event occurred—the depot was found! We determined to hold the Christmas feast. After a cup of tea and a bit of biscuit, the rest of the lunch ration was put aside.

Webb set up his instrument in the lee of the big mound and commenced a set of observations; I sorted out gear from the depot and rearranged the sledge load; Hurley was busy in the tent concocting all kinds of dishes. As the tableware was limited to three mugs and the Nansen cooker, we

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had to come in to deal with each course the moment it was ready. Aiming at a really high-class meal, Hurley had started by actually cleaning out the cooker.

The absence of reindeer-hair and other oddments made everything taste quite strange, though the basis was still the same old ration with a few remaining "perks." After the "raisin gliders," soup and a good stiff hoosh, Webb finished his observations while I recorded for him. It is wonderful what sledging does for the appetite. For the first week of the journey, the unaccustomed ration was too much for us ; but now when Hurley announced " Pudding ! " we were all still ravenous. It was a fine example of ye goode olde English plum-pudding, made from biscuit grated with the Bonsa-saw, fat picked out of the pemmican, raisins and glaxo-and-sugar, all boiled in an old food-bag.

This pudding was so filling that we could hardly struggle through a savoury, " Angels on runners," and cocoa. There was a general recovery when the " wine " was produced, made from stewed raisins and primus alcohol ; and "The King" was toasted with much gusto. At the first sip, to say the least, we were disappointed. The rule of " no heel taps " nearly settled us, and quite a long interval and cigars, saved up for the occasion by Webb, were necessary before we could get courage enough to drink to the Other Sledging Parties and Our Supporting Party.

The sun was low in the south when, cigars out and conversation lagging, we finally toggled in for the finest sleep of the whole journey.

The cook, under a doubtful inspiration, broke forth, later on, into a Christmas Carol :

I've dined in many places but never such as these—
It's like the Gates of Heaven when you find you've lost the keys.
I've dined with kings and emperors, perhaps you scarce believe ;
And even they do funny things when round comes Christmas Eve.
I've feasted with iguanas on a lonely desert isle ;
Once in the shade of a wattle by a maiden's winsome smile.
I've " grubbed " at a threepenny hash-house, I've been at a
counter-lunch,

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Reclined at a slap-up café where only the "swankers" munch.
In short, I've dined from Horn to Cape and up Alaska-way
But the finest, funniest dinner of all was on that Xmas Day.

For the first ten miles on the afternoon of the 28th, the sail was reefed down to prevent the sledge overrunning us on smooth patches. Not far past the one-hundred-and-ninety-mile mound, which was missed in the drift, we picked up some of the outward tracks—a bas-relief of three footsteps and a yard of sledge-meter track, raised half an inch and undercut by the wind. It was not very much, but quite a comfort when one is navigating in blinding weather.

At 11.30 P.M. we had marched twenty-one miles, and both light and surface were improving, so I proposed making a long run of it. Hurley and Webb eagerly agreed, and we had a preparatory hoosh. Ten miles scudded by monotonously without a sign of the mounds around the one-hundred-and-seventy-mile camp. As we were in the vicinity of a point where we had determined to diverge from our outward track, a course was laid direct for the one-hundred-and-thirteen-mile mark. The sledge-meter, which had been affixed, made its presence evident from time to time by ringing like a cash register, as still another broken spoke struck the forks. We would halt for a moment and extract the remains. Out of the original thirty-six wire spokes, only twelve wire and one wooden one remained. At 11.30 A.M. on December 29, a halt was called and the sledge-meter was then lying over on its side with a helpless expression. It indicated twenty-two miles, making, so we thought, a total of forty-three miles in the twenty-two and a quarter hours since leaving the depot. Observations for position next day proved that in its dying effort it exaggerated the truth; the total run being 41.6 miles.

We were now well ahead of schedule time, there being four and a half days' surplus food; above what was probably required to reach the sixty-seven-and-a-half-mile depot. It was decided to hold three days of this and to use one and a

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half days' food as a bonus during the coming week, as long as we were ahead of our necessary distance. The sledging ration is quite enough to live on, but for the whole of the journey we had felt that we could have done more distance on a slightly larger ration. This may be partly explained by our comparatively high altitude.

Next morning the sledge-meter was cut away and stuck in the snow. It looked very forlorn sitting askew in its forks, with a pair of worn-out finnesko hanging over it.

After twelve miles with a favourable wind, Webb took more observations; Hurley and I recording by turns. There were several small holes in the tent which needed mending, and I experimented with adhesive plaster from the medical kit with great success. Heated over a fusee and pressed hard down between the bottoms of mugs, held outside and inside, the patches adhered well and made a permanent job.

Early on December 31, 1912, snow was falling. The light gave Hurley an attack of snow-blindness and a miserable day. Crampons were worn to give some security to the foothold on the uneven track. The position, after a trudge of fifteen miles, was estimated as five miles east of the one-hundred-and-twenty-three-mile mound.

On New Year's Day, 1913, the wind was fresher and the surface improved. Estimation placed us to the north of one hundred and thirteen miles, but we were not hopeful in the light falling snow of seeing a mound. Soon, however, the snow ceased, and Webb made out a hillock two miles ahead. It was identified as the one at one hundred and nine miles.

It had been my turn to be snowblind. I was so bad that the only thing to do was to camp or ride on the sledge. The trail changed here to straight downwind, so Webb and Hurley undertook the job, hauling the sledge with me as a passenger for three and a half miles to the one-hundred-and-five-mile mound. It must have been a trying finish to a run of twenty miles.

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In spite of the spell, which was a sleepless one, I was no better in the morning and again had to ride. The others pulled away for five miles with a good helping wind, but in a provoking light. The camp was made where the one-hundred-mile-mound was judged to be. We spent longer than usual over lunch, hoping that the clouds would clear. At last we moved on, or rather, *I* was moved on. After two miles the surface became heavier. My eyes were better now on account of the rest and a snow "poultice" Webb had invented. I harnessed-in for five miles over light, unpacked snow, with piecrust underneath. The day's work was twelve miles.

The snow-clouds broke at noon on January 3, and a reliable latitude was obtained. It agreed with our reckoning. Persevering over the same trying surface as on the previous day, we sighted the ninety-mile-mound in the rear as a rift broke in the sky. We must have passed a few hundred yards from it.

We were still eleven miles from the depot, so at breakfast on the 4th the rations were reduced by one-half to give plenty of time to locate our goal. On the 4th the sky was clear, but surface drift prevented us from seeing any mounds till, in the afternoon, the ramps near the sixty-seven-mile depot were discovered in fitful glimpses. They bore too much to the north, so we altered the course correspondingly to the west, camping in rising wind and drift, with great hopes for the morrow.

A densely overcast sky on the 5th: light snow falling! We moved on two miles, but not being able to see one hundred yards, camped again; then walking as far as seemed safe in various directions. One could do nothing but wait for clear weather. The clouds lightened at 6 P.M. and again at 9 P.M., when altitudes of the sun were secured, which placed us four miles south of the depot.

With only one chronometer watch, one has to rely entirely on dead reckoning for longitude, the rate of a single watch being very variable. The longitude obtained on this

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occasion from our latest known rate moved us several miles to the east of the depot, so I concluded that our distances since the camp at ninety miles had been overestimated, and that we were probably to the south-east of it. Accordingly, we shifted four miles to the north-west, but by this time it had again clouded over and nothing could be seen.

On the 6th the sky was still overcast, but a lucky peep at noon aligned us on the exact latitude of the depot. We walked east and west, but it snowed persistently and everything was invisible.

It is weary work waiting in the tent for weather to improve. During this time Hurley amused himself and us by composing a Christmas carol on the Christmas dinner; a fragment from which has already appeared. I whiled away a whole afternoon, cutting up the remains of two cigars which had refused to draw. Sliced up with a pair of scissors and mixed with a few of Hurley's cigarettes, they made very good smoking tobacco.

On the 7th the sky was immovable, and we trekked four miles due east, camped once more and walked about without finding our goal.

I now decided that if the weather did not improve by the morning, we should have to dash for the north. It was a risk, but matters were coming to a serious pass. On broaching the subject to Webb and Hurley, they unconditionally agreed with me.

At 3 A.M. the sky cleared rapidly and we turned out and saw the ramps plainly to the east. Webb set up the theodolite while Hurley and I paced out a half-mile base-line to find out the intervening distance. Just as we got to the end of it, however, the clouds came over again and the ramps faded.

There was only one thing for it now, and that was to make a break for the coast. Of food, there was one full day's ration with enough pemmican for half a hoosh, six lumps of sugar and nine raisins, rather the worse for wear, oil for two days, and, last but not least, a pint of alcohol.



HURLEY IN SLEDGING GARB

Webb

THE SOUTH MAGNETIC POLE

After four days on half-rations we felt fairly fit, thanks no doubt to the good meals of the previous week.

There were sixty-seven miles to go, and in case we did not happen on the narrow descent to the Hut, the food was apportioned to last for five days. Everything unessential was stripped off the sledge, including dip-circle, thermometers, hypsometer, camera, spare clothing and most of the medical and repair kits.

At 7 A.M. we set off on the final stage of the journey. The sky was densely overcast and snow was falling, but there was a strong wind almost behind. We would march for an hour by my wrist-watch, halt for five minutes and on again till all agreed that we had covered ten miles; when it was lunch time. Each man's share of this consisted of one-third of a biscuit, one-third of an ounce of butter and a drink made of a spoonful of glaxo-and-sugar and one of absolute alcohol, mixed in a mug of lukewarm water. We could not afford oil enough to do much more than thaw the water, but the alcohol warmed us splendidly, enabling us to get a good rest.

After an hour's spell we started again, luckily seeing just enough of the sun to check the course. The wind grew stronger in the afternoon and several times dense fog-banks drove down on us. Meeting one steep rise, we sidled round it for what seemed hours, but my chief memory of that afternoon was of the clouds of the northern horizon. They were a deep bluish-grey colour—a typical "water-sky"—but I have never seen clouds moving so fast. It was like trying to steer by one particular phase in a kaleidoscope. When all were satisfied that twenty miles had been covered we camped.

Dinner consisted of a very watery hoosh, followed up by a mug of alcohol and water. We were all very thankful for the forethought of Dr. Mawson in providing absolute alcohol for lighting the primus, instead of methylated spirit.

Breakfast on the 9th was of about the same consistency

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as dinner on the night before, except that cocoa replaced the alcohol. In fact, breakfast was possibly even more watery, as I was in charge of the food-bag and surreptitiously decided to make the rations last six days instead of five.

This was the worst day's march of the journey. The wind was booming along at sixty miles per hour with dense drift and falling snow. What made it worse was that it came from the south-east, forcing us to pull partly across it. I was the upwind wheeler and had to hitch on to the side of the sledge to reduce the leeway as much as possible. The sledge was being continually jammed into big, old, invisible sastrugi and we fell about in the wind until crampons became absolutely necessary.

At 4 P.M. we were disgusted to find that the wind had veered to south-by-east. So for possibly several hours we had been doing Heaven only knows how many times the amount of work necessary, and for any time up to four hours might have been marching three points off our course. Being blown straight downwind, the sledge made rapid progress, and about 6 P.M. a halt was called for lunch. This was over almost as soon as it was begun, but we had a good rest, sheltering ourselves with the floor-cloth from the wind which blew through the tent.

Off again, we "plugged" away until midnight when we were much surprised to find the usual snow surface merging into blue ice. The tent was pitched on the latter, snow being procured from the bridge of a crevasse as we had no pick: even the ice-axe having been left behind.

Turning out on the morning of the 10th, we were delighted to find the sky clearing and the wind moderating. And then, far away on the northern horizon a beautiful line of blue sea dotted with bergs!

We now officially considered ourselves to be twenty-seven miles from the Hut. As we should not have met blue ice on the proper course till we were only thirteen miles out, it was thought that we had edged a long way to the east

THE SOUTH MAGNETIC POLE

the day before. When a start was made, we manœuvred to the west in looking for a crossing-place at each crevasse.

It was not long before the bergs on the horizon were noticeably enlarging, and at last we realized that in reality it was only a few miles to them. Suddenly the grade increased, the ice becoming much lacerated; and we had some trouble getting the sledge along. Hurley was snow-blind and had one eye covered. He looked very comical feeling his way over the crevasses, but he probably did not feel over-humorous.

I was in the lead, and suddenly coming over a ridge above a steep ice-fall, I caught sight of the Mackellar Islets and the old "Piano" berg. Just at the same instant the spur of ice on which I was standing collapsed, and down I went into a crevasse. The others quickly had me out, and, as soon as I was in the upper air, I gave them the news: "There are the Islands!" Being twenty feet farther back on the rope they had not yet seen them.

We were now able to place ourselves about three miles west of Aladdin's Cave. The last camp must have been thirteen miles from the Hut, and we had really done twenty-seven miles each day instead of our conservative twenty.

We tried to work along to the east, but the ice was too much broken, so the camp was made on a patch of snow. In view of our good fortune, I produced that evening's ration of hoosh in addition to our usual lunch. Even this meagre spree went against Hurley's feelings, for, being snow-blind, he had not been able to see the islands and positively would not believe that we were nearly home.

After lunch it was necessary to retrace our way upwind to get out of the rough country. About midnight, Webb recognized Aladdin's Cave. Hurley and I had a competition as to who should see it first, for I was also getting a little blind again. We had a dead-heat at one hundred and fifty yards.

The first thing to arrest our attention was a tin of dog biscuits. These kept things going till we dug out a food-

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tank from which was rapidly extracted a week's supply of chocolate. After that we proceeded in a happier frame of mind to open up the cave and have a meal.

The journey of more than six hundred miles was now practically over. After a carousal lasting till 5 P.M. on the 11th, we went down hill, arriving just after dinner and finding all well.

We three had never thought the Hut quite such a fine place, nor have we ever since.



Adelie Land

CORRELL ON THE EDGE OF A RAVINE IN THE ICE-SHEET

Harley



MADGAN'S, MURPHY'S, AND STILLWELL'S PARTIES BREAKING CAMP AT ALADDIN'S CAVE AT
THE COMMENCEMENT OF THE SUMMER JOURNEYS

CHAPTER XV
EASTWARD OVER THE SEA-ICE

BY C. T. MADIGAN

Harnessed and girt in his canvas bands,
Toggled and roped to his load ;
With helmeted head and bemittened hands,
This for his spur and his goad :

“Out in the derelict fastnesses bare
Some whit of truth may be won.”
Be it a will o’ the wisp, he will fare
Forth to the rising sun.

The Sledge Horse

THE Eastern Coastal party consisted of Dr. A. L. McLean, P. E. Correll and myself. For weeks all preparations had been made ; the decking put on the sledge, runners polished, cooker- and instrument-boxes attached, mast erected, spar and sail rigged, instruments and clothing collected, tent strengthened—all the impedimenta of a sledge journey arranged and rearranged, and still the blizzard raged on. Would we never get away ? November arrived, and still the wind kept up daily averages of over fifty miles per hour, with scarce a day without drifting snow.

At last it was decided that a start must soon be made even though it ended in failure, so that we received orders to set out on November 6, or the first possible day after it.

Friday November 8 broke, a clear driftless day, and Murphy’s party left early in the morning. By noon, Stillwell’s party (Stillwell, Hodgeman and Close), and we, were

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ready to start. The former were bound on a short journey to the near east and were to support us until we parted company.

All was bustle and excitement. Every one turned out to see us off. Breaking an empty sauce-bottle over the bow of our sledge, we christened it the M.H.S. Championship (Man-Hauled Sledge). The name was no boastful prevision of mighty deeds, as, at the Hut, a "Championship" was understood to mean some careless action usually occasioning damage to property, while our party included several noted "champions."

Mertz harnessed a dog-team to the sledge and helped us up the first steep slope. With hearty handshakes and a generous cheer from the other fellows, we started off and were at last away, after many months of hibernation in the Hut, to chance the hurricanes and drifting snow and to push towards the unknown regions to the east.

At the steepest part of the rise we dismissed our helpers and said good-bye. McLean and Correll joined me on the sledge and we continued on to Aladdin's Cave.

As we mounted the glacier the wind increased, carrying surface drift which obscured the view to within one hundred yards. It was this which made us pass the Cave on the eastern side and pull up on a well-known patch of snow in a depression to the south of our goal. It was not long before a momentary clearing of the drift showed Aladdin's Cave with its piles of food-tanks, kerosene, dog biscuit and pemmican, and, to our dismay, a burberry-clad figure moving about among the accumulation. Murphy's party were in possession when we expected them to be on the way south to another cave—the Cathedral Grotto—eleven and three-quarter miles from the Hut. Of course the rising wind and drift had stopped them.

It was then 5 P.M., so we did not wait to discuss the evident proposition as to which of the three parties should occupy the Cave, but climbed down into it at once and boiled up hoosh and tea. Borrowing tobacco from the

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supporting parties, we reclined^vat ease, and then in that hazy atmosphere so dear to smokers, its limpid blue enhanced by the pale azure of the ice, we introduced the subject of occupation as if it were a sudden afterthought.

It was soon decided to enlarge the Cave to accommodate five men, the other four consenting to squeeze into Stillwell's big tent. McLean volunteered to join Stillwell's party in the tent, while Correll and I were to stay in the Cave with Murphy and company.

I went outside and selected ten weeks' provisions from the pile of food-tanks and piled them beside the sledge. McLean attended to the thermograph which Bage and I had installed in the autumn. Meanwhile, in a fifty-mile wind, Stillwell and his men erected the tent. Hunter and Laseron started with picks and shovels to enlarge the Cave, and, working in relays, we had soon expanded it to eight feet by seven feet.

The men from the tent came down to "high dinner" at eight o'clock. They reported weather conditions unimproved and the temperature -3° F.

Early next morning I dug my way out and found that the surface drift had increased with a wind of fifty-five miles per hour. It was obviously impossible to start.

After breakfast it was arranged that those outside should have their meals separately, digging down at intervals to let us know the state of the weather. It was not pleasant for us, congested as we were in the Cave, to have visitors sliding down through the opening with a small avalanche of snow in their train. Further, to increase their own discomfort, they arrived covered in snow, and what they were unable to shake off thawed and wet them, subsequently freezing again to the consistency of a starched collar.

The opening was, therefore, kept partly closed with a food-tank. The result was that a good deal of snow came in, while the hole diminished in size. For a man to try to crawl out in stiff burberrys appeared as futile as for a porcupine to try to go backwards up a canvas hose.

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The day passed slowly in our impatience. We took turns at reading *The Virginian*, warmed by a primus stove which in a land of plenty we could afford to keep going. Later in the afternoon the smokers found that a match would not strike, and the primus went out. Then the man reading said that he felt unwell and could not see the words. Soon several others commented on feeling "queer," and two in the sleeping-bags had fallen into a drowsy slumber. On this evidence even the famous Watson would have "dropped to it," but it was some time before it dawned on us that the oxygen had given out. Then there was a rush for shovels. The snow, ice and food-tank were tightly wedged, at the mouth of the entrance, and it took some exertion to perforate through to the outside air with an ice-axe. At once every one speedily recovered. Later, another party had a worse experience, not forgetting to leave a warning note behind them. We should have done the same.

The weather was no better by the evening, and during the night the minimum thermometer registered -12° F.

At six o'clock on Sunday morning, November 10, McLean dug down to us with the news that the wind had abated to thirty miles per hour with light surface drift.

We hurried through breakfast, rolled up the bags and started packing the sledge. Three 100-lb. food-tanks, one 50-lb. bag opened for ready use, and four gallons of kerosene were selected. Stillwell took for us a 50-lb. food-tank, a 56-lb. tin of wholemeal biscuits, and a gallon of kerosene. With the 350 lbs. of food, 45 lbs. of kerosene, three sleeping-bags of 10 lbs. each, a tent of 40 lbs., 36 lbs. of clothing and personal gear for three men, a cooker, primus, pick, shovel, ice-axe, alpine rope, dip-circle, theodolite, tripod, smaller instruments such as aneroid, barometer and thermometer, tools, medical outfit and sledge-fittings, our total load amounted to nearly 800 lbs., and Stillwell's was about the same.

All were ready at 9 A.M., and, shaking hands with Murphy's party, who set off due south, we steered with Stillwell to

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the south-east. The preliminary instructions were to proceed south-east from the Cave to a distance of eighteen miles and there await the arrival of Dr. Mawson and his party, who were to overtake us with their dog-teams.

The first few miles gave a gradual rise of one hundred feet per mile, so that, with a heavy load against wind and drift, travelling was very slow. The wind now dropped to almost calm, and the drift cleared. In the afternoon progress was hampered by crevasses, which were very frequent, running east and west and from one to twenty feet in width. The wider ones were covered with firm snow-bridges; the snow in places having formed into granular and even solid ice. What caused most delay were the detours of several hundreds of yards which had to be made to find a safe crossing over a long, wide crevasse. At 6.30 P.M. we pitched camp, having only made five miles from the Cave.

We got away at 9 A.M. the next morning. Throughout the whole journey we thought over the same mysterious problem as confronted many another sledger: Where did the time go to in the mornings? Despite all our efforts we could not cut down the interval from "rise and shine" to the start below two hours.

Early that day we had our first experience of the treacherous crevasse. Correll went down a fissure about three feet wide. I had jumped across it, thinking the bridge looked thin, but Correll stepped on it and went through. He dropped vertically down the full length of his harness—six feet. McLean and I soon had him out. The icy walls fell sheer for about sixty feet, where snow could be seen in the blue depths. Our respect for crevasses rapidly increased after this, and we took greater precautions, shuddering to think of the light-hearted way we had trudged over the wider ones.

At twelve miles, blue, wind-swept ice gave place to an almost flat snow surface. Meanwhile the sky had rapidly

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clouded over, and the outlook was threatening. The light became worse, and the sastrugi indistinguishable. Such a phenomenon always occurs on what we came to call a "snow-blind day." On these days the sky is covered with a white, even pall of cloud, and cloud and plateau seem as one. One walks into a deep trench or a sastruga two feet high without noticing it. The world seems one huge, white void, and the only difference between it and the pitch-dark night is that the one is white and the other black.

Light snow commenced at 2.30 P.M., the wind rising to forty-five miles per hour with heavy drift. Thirteen miles out we pitched camp.

This, the first "snow-blind day" claimed McLean for its victim. By the time we were under cover of the tent, his eyes were very sore, aching with a throbbing pain. At his request I placed a zinc-cocaine tablet in each eye. He spent the rest of the day in the darkness of his sleeping-bag and had his eyes bandaged all next day. Up till then we had not worn goggles, but were careful afterwards to use them on the trying, overcast days.

For four and a half days the weather was too bad to travel. On the 14th the wind increased and became steady at sixty miles per hour, accompanied by dense drifting snow. We found it very monotonous lying in the tent. As always happens during heavy drifts, the temperature outside was high, on this day averaging about 12° F.; inside the tent it was above freezing-point, and the accompanying thaw was most unpleasant.

Stillwell's party had pitched their tent about ten paces to the leeward side of ours, of which stratagem they continually reminded us. Going outside for food to supply our two small meals per day was an operation fraught with much discomfort to all. This is what used to happen. The man on whom the duty fell had to insinuate himself into a bundle of wet burberrys, and, as soon as he was outside, they froze stiff. When, after a while, he signified his intention of coming in, the other two would collect everything to one end of the

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tent and roll up the floor-cloth. Plastered with snow, he entered, and, despite every precaution, in removing burberrys and brushing himself he would scatter snow about and increase the general wetness. On these excursions we would visit Stillwell's tent and be hospitably, if somewhat gingerly, admitted; the inmates drawing back and pulling away their sleeping-bags as from one with a fell disease. As a supporting party they were good company, among other things, supplying us with tobacco *ad libitum*. When we parted, five days after, we missed them very much.

During the night the wind blew harder than ever—that terrible wind, laden with snow, that blows for ever across the vast, mysterious plateau, the “wind that shrills all night in a waste land, where no one comes or hath come since the making of the world.” In the early hours of the morning it reached eighty miles per hour.

Not till 9 next morning did the sky clear and the drift diminish. Considering that it had taken us eight days to do thirteen miles, we decided to move on the 16th at any cost.

Our library consisted of *An Anthology of Australian Verse*, Thackeray's *Vanity Fair* and *Hints to Travellers* in two volumes. McLean spent much of the time reading the Anthology and I started *Vanity Fair*. The latter beguiled many weary hours in that tent during the journey. I read a good deal aloud and McLean read it afterwards. Correll used to pass the days of confinement arranging rations and costs for cycling tours and designing wonderful stoves and cooking utensils; all on the sledging, “cut down weight” principle.

On the 16th we were off at 9 A.M. with a blue sky above and a “beam” wind of thirty-five miles per hour. Up a gentle slope over small sastrugi the going was heavy. We went back to help Stillwell's party occasionally, as we were moving a little faster.

Just after lunch I saw a small black spot on the horizon to the south. Was it a man? How could Dr. Mawson

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have got there? We stopped and saw that Stillwell had noticed it too. Field-glasses showed it to be a man approaching, about one and a half miles away. We left our sledges in a body to meet him, imagining all kinds of wonderful things such as the possibility of it being a member of Wild's party—we did not know where Wild had been landed. All the theories vanished when the figure assumed the well-known form of Dr. Mawson. He had made a little more south than we, and his sledges were just out of sight, about two miles away.

Soon Mertz and Ninnis came into view with a dog-team, which was harnessed on to one sledge. All hands pulled the other sledge, and we came up fifteen minutes later with Dr. Mawson's camp at eighteen and a quarter miles. In the good Australian way we sat round a large pot of tea and after several cups put up our two tents.

It was a happy evening with the three tents grouped together and the dogs securely picketed on the great plateau, forming the only spot on the limitless plain. Every one was excited at the prospect of the weeks ahead; the mystery and charm of the "unknown" had taken a strange hold on us.

Ninnis and Mertz came into our tent for a short talk before turning in. Mertz sang the old German student song :

Studio auf einer Reis'
Immer sich zu helfen weis
Immer fort durch's Dick und Dünn
Schlendert es durch's Leben hin.

We were nearly all University graduates. We knew that this would be our last evening together till all were safely back at the Hut. No thought was farther from our minds than that it was the last evening we would ever spend with two companions, who had been our dear comrades for just a year.

Before turning into sleeping-bags, a messenger brought me dispatches from the general's tent—a letter on the

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plateau. This proved to be the instructions to the Eastern Coastal Party. Arriving back at the Hut by January 15, we were to ascertain as much as possible of the coast lying east of the Mertz Glacier, investigating its broad features and carrying out the following scientific work: magnetic, biological and geological observations, the character, especially the nature and size of the grains of ice or snow surfaces, details of sastrugi, topographical features, heights and distances, and meteorology.

On Sunday, November 17, we moved on together to the east with the wind at fifteen miles an hour, the temperature being 9° F. The sun shone strongly soon after the start, and with four miles to our credit a tent was run up at 1 P.M., and all lunched together on tea, biscuit, butter and chocolate. Up to this time we had had only three *al fresco* lunches, but, as the weather seemed to be much milder and the benefit of tea and a rest by the way were so great, we decided to use the tent in future, and did so throughout the journey.

In the afternoon, Dr. Mawson's party forged ahead, the dogs romping along on a downhill grade. We took the bit in our teeth as we saw them sitting on their sledges, growing smaller and smaller in front of us. We came up with them again as they had waited to exchange a few more words at a point on the track where a long extent of coast to the east came into view.

Here we bade a final adieu to Dr. Mawson, Mertz and Ninnis. The surface was on the down grade towards the east, and with a cheer and farewell wave they started off, Mertz walking rapidly ahead, followed by Ninnis and Dr. Mawson with their sledges and teams. They were soon lost to view behind the rolling undulations.

A mile farther on we pitched camp at 8 P.M. in a slight depression just out of sight of the sea. Every one slept soundly after a good day's pulling.

November 18 was a bright dazzling day, the sky dotted with fleecy alto-cumulus. At 6 A.M. we were out to find

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Stillwell's party moving in their tent. There was a rush for shovels to fill the cookers with snow and a race to boil hoosh.

At this camp we tallied up the provisions, with the intention of taking what we might require from Stillwell and proceeding independently of him, as he was likely to leave us any day. There were fifty-nine days to go until January 15, 1913, the latest date of arrival back at the Hut, for which eight weeks' rations were considered to be sufficient. There were seven weeks' food on the sledge, so Stillwell handed over another fifty-pound bag as well as an odd five pounds of wholemeal biscuit. The total amount of kerosene was five gallons, with a bottle of methylated spirit.

Shortly after eight o'clock we caught sight of Dr. Mawson's camp, and set sail to make up the interval. This we did literally as there was a light westerly breeze—the only west wind we encountered during the whole journey.

The sledge was provided with a bamboo mast, seven feet high, stepped behind the cooker-box and stayed fore and aft with wire. The yard was a bamboo of six feet, slung from the top of the mast, its height being varied by altering the length of the slings. The bamboo was threaded through canvas leads in the floor-cloth which provided a spread of thirty square feet of sail. It was often such an ample area that it had to be reefed from below.

With the grade sloping gently down and the wind freshening, the pace became so hot that the sledge often overran us. A spurious "Epic of the East" (see *Adelie Blizzard*) records it :

Crowd on the sail—

Let her speed full and free "on the run"

Over knife-edge and glaze, marble polish and pulverized chalk

The finnesko glide in the race, and there's no time for talk.}]

Up hill, down dale,

It's all in the game and the fun.

We rapidly neared Dr. Mawson's camp, but when we were within a few miles of it, the other party started in a south-

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easterly direction and were soon lost to sight. Our course was due east.

At thirty-three and a half miles the sea was in sight, some fine flat-topped bergs floating in the nearest bay. Suddenly a dark, rocky nunatak sprang into view on our left. It was a sudden contrast after ten days of unchanging whiteness, and we felt very anxious to visit this new find. As it was in Stillwell's limited territory we left it to him.

According to the rhymester it was:

A rock by the way—
A spot in the circle of white—
A grey, craggy spur plunging stark through the deep-splintered ice.
A trifle! you say, but a glow of warm land may suffice
To brighten a day
Prolonged to a midsummer night.

After leaving Aladdin's Cave, our sledge-meter had worked quite satisfactorily. Just before noon, the casting attaching the recording-dial to the forks broke—the first of a series of break-downs. Correll bound it up with copper wire and splints borrowed from the medical outfit.

The wind died away and the sail was of little use. In addition to this, we met with a slight up grade on the eastern side of the depression, our rate diminishing accordingly. At 7 P.M. the tent was pitched in dead calm, after a day's run of fifteen miles with a full load of almost eight hundred pounds—a record which remained unbroken with us till near the end of the outward journey. Looking back, the nunatak and bergs were still visible.

Both parties were under way at 8 A.M. next day (November 19) on a calm and sunny morning. The course by sun-compass was set due east.

At noon I took a latitude "shot" with the three-inch Cary theodolite. This little instrument proved very satisfactory and was easily handled in the cold. In latitude $67^{\circ}15'$ south, forty-six and a half miles east of the Hut, we were once more on level country with a high rise to the north-east and another shallow gully in front.

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A fog which had been moving along the sea-front in an opaque wall drifted over the land and enveloped us. Beautiful crystals of ice in the form of rosettes and small fern-fronds were deposited on the cordage of the sail and mast. One moment the mists would clear, and the next, we could not see more than a few hundred yards.

We now parted with Stillwell, Hodgeman and Close, who turned off to a rising knoll—Mount Hunt—visible in the north-east, and disappeared in the fog.

After the halt at noon the sastrugi became much larger and softer. The fog cleared at 2 P.M. and the sun came out and shone very fiercely. A very inquisitive skua gull—the first sign of life we had seen thus far—flew around the tent and settled on the snow near by. In the calm, the heat was excessive and great thirst attacked us all the afternoon, which I attempted to assuage at every halt by holding snow in my hands and licking the drops of water off my knuckles—a cold and unsatisfactory expedient. We travelled without burberrys—at that time quite a novel sensation—wearing only fleece suits and light woollen undergarments. Correll pulled for the greater part of the afternoon in underclothing alone.

At forty-nine and a half miles a new and wonderful panorama opened before us. The sea lay just below, sweeping as a narrow gulf into the great, flat plain of debouching glacier-tongue which ebbed away north into the foggy horizon. A small ice-capped island was set like a pearl in the amethyst water. To the east, the glacier seemed to fuse with the blue line of the hinterland. Southward, the snowy slope rose quickly, and the far distance was unseen.

We marched for three-quarters of a mile to where a steep down grade commenced. Here I made a sketch and took a round of angles to all prominent features, and the conspicuous, jutting, seaward points of the glacier. McLean and Correll were busy making a snow cairn, six feet high, to serve as a back-sight for angles to be taken at a higher eminence southward.

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We set out for the latter, and after going one and a half miles it was late enough to camp. During the day we had all got very sunburnt, and our faces were flushed and smarting painfully. After the long winter at the Hut the skin had become more delicate than usual.

Under a clear sky, the wind came down during the night at forty-five miles per hour, lashing surface drift against the walls of the tent. It was not till ten o'clock that the sledge started, breaking a heavy trail in snow which became more and more like brittle piecrust. There was at first a slight descent, and then we strained up the eminence to the south over high sastrugi running almost north and south. Capsizes became frequent, and to extricate the heavy sledge from some of the deep furrows it was necessary to unload the food-bags. The drift running over the ground was troublesome when we sat down for a rest, but, in marching, our heads were just clear of it.

It was a long laborious day, and the four miles indicated by the inexorable sledge-meter seemed a miserable result. However, near the top of the hill there was a rich reward. A small nunatak slanted like a steel-blue shadow on the side of a white peak to the south-west. There was great excitement, and the sledge slid along its tracks with new life. It was rock without a doubt, and there was no one to dispute it with us. While speculating wildly as to its distance, we came unexpectedly to the summit of the hill.

The wind had subsided, the sky was clear and the sun stood low in the south-west. Our view had widened to a noble outlook. The sea, a delicate turquoise-blue, lay in the foreground of the low, white, northern ice-cliffs. Away to the east was the dim suggestion of land across the bed of the glacier, about which circled the southerly highlands of the plateau, buried at times in the haze of distance. Due south, twenty miles away, projecting from the glacier, was another island of rock. The nunatak first seen, not many miles to the south-west, was a snowy mountain streaked with sprouting rock, rising solitary in an indentation of the

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land. We honoured our Ship by calling it Aurora Peak, while our camp stood on what was thenceforth to be Mount Murchison.

It was obvious that this was the place for our first depot. I had decided, too, to make it the first magnetic station and the point from which to visit and explore Aurora Peak. None of us made any demur over a short halt. Correll had strained his back during the day from pulling too hard, and was troubled with a bleeding nose. My face was very sore from sunburn, with one eye swollen and almost closed, and McLean's eyes had not yet recovered from their first attack of snow-blindness.

November 21 was a day in camp. Most of the morning I spent trying, with Correll's help, to get the declination needle to set. Its pivot had been destroyed in transit and Correll had replaced it by a gramophone needle, which was found too insensitive. There was nothing to do but use the three-inch theodolite, which, setting to one degree, would give a good result, with a mean of thirty-two settings, for a region with such variable magnetic declination. A latitude "shot" was made at noon, and in the afternoon I took a set of dip determinations. These, with a panoramic sketch from the camp, a round of angles to conspicuous points and an observation at 5.30 P.M. for time and azimuth completed the day's work. Correll did the recording.

Meanwhile, McLean had built an eight-foot snow mound, erected a depot flag upon it and taken several photographs.

The next day was devoted to an excursion to Aurora Peak. The weather was, to our surprise, quite clear and calm. Armed with the paraphernalia for a day's tour, we set off down the slope. Correll put the primus stove and the inner pot of the cooker in the ready food-bag, McLean slung on his camera and the aneroid barometer, while I took my rüch-sack with the rations, as well as field-glasses and an ice-axe. In case of crevasses, we attached ourselves to an alpine rope in long procession. According to the "Epic" it was something like this :

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We saddled up, adventure-bent ;
Locked up the house—I mean the tent—
Took “ grub ” enough for three young men
With appetites to equal ten.
A day’s outing across the vale.
Aurora Peak ! What ho ! All hail !

We waltzed a’down the silvered slope,
Connected by an Alpine rope ;
“ Madi ” in front with ice-axe armed,
For fear that we should feel alarmed.
Glad was the hour, and—what a lark !
Explorers three ? “ Save the mark ! ”

The mystery of the nunatak was about to be solved. Apparently it rose from the level of the glacier, as our descent showed its eastern flank more clearly outlined. It was three miles to the bottom of the gully, and the aneroid barometer registered one thousand one hundred and ninety feet. The surface was soft and yielding to finnesko crampons, which sank through in places till the snow gripped the knees.

Ascending on the other side we crossed a small crevasse and the peak towered above us. The northern side terminated in a perpendicular face of ice, below which a deep basin had been “ scalloped ” away ; evidently kept clear by eddies of wind. In it lay broken fragments of the overhanging cliff. The rock was a wide, outcropping band curving steeply to the summit on the eastern aspect.

After a stiff climb we hurried eagerly to the rock as if it were a mine of inexhaustible treasure. The boulders were all weathered a bright red and were much pitted where ferruginous minerals were leached out. The rock was a highly quartzose gneiss, with black bands of schist running through it. Moss and lichens were plentiful, and McLean collected specimens.

The rocky strip was eighty feet wide and three hundred feet high, so, making a cache of the primus, provisions and burberrys, we followed it up till it became so steep that it was necessary to change to the snow. This was in the form of hard névé with patches of ice. I went first, cutting steps with the ice-axe, and the others followed on the rope.

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The last ten of more than one hundred steps were in an almost vertical face, which gave a somewhat precarious foothold.

At 11.30 A.M. we stood on the summit at an altitude of one thousand seven hundred and fifty feet, while across the valley to the north-east rose Mount Murchison, one hundred and fourteen feet higher. The top of the ridge was quite a knife-edge, with barely space for standing. It ran mainly north and south, dipping in the centre, to curve away sharply westward to a higher eminence. At the bend was an inaccessible patch of rock. The surrounding view was much the same as that on Mount Murchison.

The Union Jack and the Australian flag were erected on a bamboo, and photographs taken. At the same time, low, threatening clouds rapidly emerged from the south-east, covering the sun and creating the "snow-blind" light. This was rather alarming as the climb had been difficult enough under a clear sky, and the descent was certainly much more difficult. So we hastily ate some chocolate and discussed the best way down.

Prospecting to the north, in search of a long snow ramp which appeared to run away in that direction, we scrambled down to the edge of a wide snowy crevasse full of blue chinks.

Turning back, we considered the chances of sliding down a steep scoured hollow to the west and finally decided to descend by the track we had cut.

McLean started off first down the steps and was out of sight in a few moments. When the rope tightened, Correll followed him and then I came last. It was very ticklish work feeling for the steps below with one's feet, and, as we signalled to one another in turn after moving a step, it took more than an hour to reach a safe position on the rocks. With every step I drove my axe into the ice, so that if the others had fallen there would still have been a last chance.

There was no time to be wasted; light snow was falling with the prospect of becoming thicker. In the gully the snowfall became heavy, limiting the view to within a few

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hundred yards. We advanced up the hill in what seemed to be the steepest direction, but circled half-way round it before finding out that the course was wrong. Aimlessly trying to place the broad flat summit I came across tracks in the snow, which were then carefully followed and led to the tent. The wind was rising outside and the hoosh in steaming mugs was eaten with extra relish in our snug retreat.

Specimens were labelled to be depoted and provisions were arranged for the rest of the journey. It was evident that we had superfluous clothing, and so the weight of the kit-bags was scrupulously cut down. By the time we crawled into sleeping-bags, everything dispensable was piled alongside the depot-flag.

We slept the sleep of the weary and did not hear the flapping tent nor the hissing drift. At 6 A.M. the wind was doing forty miles per hour and the air was filled with snow. It must have been a new climate, for by noon the sun had unexpectedly broken through, the wind was becoming gusty and the drift trailed like scud over the surface.

With six weeks' food we set off on a new trail after lunch. The way to the eastern glacier—Mertz Glacier—issued through the mouth of the gully, which ran in an easterly direction between Aurora Peak and Mount Murchison. On Mount Murchison ice-falls and crevasses began a short distance east of our first line of descent, but yet I thought a slight deviation to the east of south would bring us safely into the valley, and, at the same time, cut off a mile. Alas! it proved to be one of those "best-laid schemes."

The load commenced to glide so quickly as we were leaving the crest of the mountain that Correll and McLean unhitched from the hauling line and attached themselves by the alpine rope to the rear of the sledge, braking its progress. I remained harnessed in front keeping the direction. For two miles we were going downhill at a running pace and then the slope became suddenly steeper

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and the sledge overtook me. I had expected crevasses, in view of which I did not like all the loose rope behind me. Looking round, I shouted to the others to hold back the sledge, proceeding a few steps while doing so. The bow of the sledge was almost at my feet, when—whizz! I was dropping down through space. The length of the hauling rope was twenty-four feet, and I was at the end of it. I cannot say that “my past life flashed before me.” I just had time to think “Now for the jerk—will my harness hold?” when there was a wrench, and I was hanging breathless over the blue depth. Then the most anxious moment came—I continued to descend. A glance showed me that the crevasse was only four feet wide, so the sledge could not follow me, and I knew with a thankful heart that I was safe. I only descended about two feet more, and then stopped. I knew my companions had pulled up the sledge and would be anchoring it with the ice-axe.

I had a few moments in which to take in my surroundings. Opposite to me was a vertical wall of ice, and below a beautiful blue, darkening to black in that unseen chasm. On either hand the rift of the crevasse extended, and above was the small hole in the snow bridge through which I had shot.

Soon I heard McLean calling, “Are you all right?” And I answered in what he and Correll thought an alarmingly distant voice. They started enlarging the hole to pull me out, until lumps of snow began to fall and I had to yell for mercy. Then I felt they were hauling, and slowly I rose to daylight.

The crevasse ran westward along the gully, forcing us to make a detour through a maze of smaller cracks. We had to retreat up the hill in one place, throwing off half the load and carrying it on in relays. There was a blistering sun and the work was hard. At last the sledge came to a clear run and tobogganed into the snow-filled valley, turning eastward towards its outlet.

At the evening camp the sledge-meter indicated that our





McLean
WORKING THE SLEDGE THROUGH BROKEN SEA-ICE, 45 MILES OFF KING GEORGE V LAND. MADIGAN, CORRELL AND McLEAN

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distance eastward of the Hut was sixty miles, one thousand two hundred yards. The northern face of the gully was very broken and great sentinel pillars of ice stood out among the yawning caves, some of them leaning like the tower of Pisa, others having fallen and rolled in shattered blocks. Filling the vision to the south-west was Aurora Peak, in crisp silhouette against a glorious radiant of cirrus cloud.

Reviewing the day through our peaceful smoke-rings, I was rather comforted by the fact that the fall into the crevasse had thoroughly tested my harness. Correll expressed himself as perfectly satisfied with his test. McLean seemed to feel somewhat out of it, being the only one without a crevasse experience; which happy state he maintained until the end, apparently somewhat to his disappointment.

On the 24th we broke camp at 9 A.M., continuing down the gully towards the glacier. A lofty wall of rocks, set within a frame of ice, was observed on our left, one mile away. To it we diverged and found it to be gneiss similar to that of Aurora Peak. Several photos were taken.

The land was at our back and the margin of the glacier had been crossed. Only too soon we were in the midst of terribly crevassed ground, through which one could only thread a slow and zig-zag course. The blue ice was riven in every direction by gaping quarries and rose smooth and slippery on the ridges which broke the surface into long waves. Shod with crampons, the rear of the sledge secured by a tail-rope, we had a trying afternoon guiding the load along the narrow ridges of ice with precipices on either hand. Fortunately the wind was not above twenty miles per hour. As the frivolous "Epic" had it:

Odds fish! the solid sea is sorely rent,
And all around we're pent
With quarries, chasms, pits, depressions vast,
Their snow-lids overcast.

A devious track, all curved and serpentine
Round snow-lids superfine.
On jutting brinks and precipices sheer
Precariously we steer.

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We pushed on to find a place in which to camp, as there was scarcely safe standing-room for a primus stove. At seventy miles the broken ice gave way to a level expanse of hard sastrugi dotted all over with small mounds of ice about four feet high. After hoosh, a friendly little Wilson petrel came flying from the northern sea to our tent. We considered it to be a good omen.

Next day the icy mounds disappeared, to be replaced by a fine, flat surface, and the day's march amounted to eleven and a quarter miles.

At 11 A.M. four snow petrels visited us, circling round in great curiosity. It is a cheerful thing to see these birds amid the lone, inhospitable ice.

We were taking in the surroundings from our position off the land scanning the far coast to the south for rock and turning round to admire the bold contours of Aurora Peak and Mount Murchison at our back. Occasionally there were areas of rubbly snow, blue ice and crevasses completely filled with snow, of prodigious dimensions, two hundred to three hundred yards wide and running as far as the eye could travel. The snow filling them was perfectly firm, but, almost always along the windward edge, probing with an ice-axe would disclose a fissure. This part of the Mertz Glacier was apparently afloat.⁴

The lucky Wilson petrel came again in the evening. At this stage the daily temperatures ranged between 10° F. and near freezing-point. The greater part of November 26 was passed in the tent, within another zone of crevasses. The overcast sky made the light so bad that it became dangerous to go ahead. At 5.30 P.M. we started, and managed to do five and a half miles before 8 P.M.

It was rather an eventful day, when across the undulating sastrugi there appeared a series of shallow valleys running eastward. As the valleys approached closer, the ground sloped down to meet them, their sides becoming steeper, buckled and broken. Proceeding ahead on an

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easterly course, our march came to an abrupt termination on an ice-bluff.

In front lay a perfectly flat snow-covered plain—the sea-ice. In point of fact we had arrived at the eastern side of the Mertz Glacier and were about fifteen miles north of the mainland. Old sea-ice, deeply covered in snow, lay ahead for miles, and the hazy, blue coast sank below the horizon in the south-east, running for a time parallel to the course we were about to take. It was some time before we realized all this, but at noon on the following day there came the first reminder of the proximity of sea-water.

An Adelie penguin, skiing on its breast from the north, surprised us suddenly by a loud croak at the rear of the sledge. As astonished as we were, it stopped and stared, and then in sudden terror made off. But before starting on its long trek to the land, it had to be captured and photographed.

To the south the coast was marked by two faces of rock and a short, dark spur protruding from beneath the ice-cap. As our friendly penguin had made off in that direction, we elected to call the place Penguin Point, intending to touch there on the return journey. During the afternoon magnetic dips and a round of angles to the prominences of the mainland were taken.

The next evidence on the sea-ice question came in the shape of a line of broken slabs of ice to the north, sticking out of the snow like the ruins of an ancient graveyard. At one hundred and fifteen miles the line was so close that we left the sledge to investigate it, finding a depression ten feet deep, through which wound a glistening riband of sea-water. It reminded one of a creek in flat, Australian country, and the illusion was sustained by a dark skua gull—in its slow flight much like a crow. It was a fissure in old thick sea-ice.

Sunday, and the first day of December, brought good weather and a clear view of the mainland. A bay opened to the east of Penguin Point, from which the coast trended to the south-east. Across a crack in the sea-ice we could

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just distinguish a low indented line like the glacier-tongue, we had already crossed. It might have been a long promontory of land for all we knew. Behind it was a continuous ice-blink and on our left, to the north, a deep blue "water sky." It seemed worth while continuing on an easterly course approximately parallel with the coast.

We were faced by another glacier-tongue; a fact which remained unproven for a week at least. From the sea-ice on to the glacier—the Ninnis Glacier—there was a gentle rise to a prominent knoll of one hundred and seventy feet. Here our distance from the Hut amounted to one hundred and fifty-two miles, and the spot was reckoned a good situation for the last depot.

In taking magnetic observations, it was interesting to find that the "dip" amounted to $87^{\circ} 44'$, while the declination, which had varied towards the west, swung at this our most northerly station a few degrees to the east. We were curving round the South Magnetic Pole. Many points on the coast were fixed from an adjoining hill to which Correll and I trudged through sandy snow, while McLean stayed behind erecting the depot-mound, placing a food-bag, kerosene tin, black cloth and miner's pick on the top.

With four weeks' provisions we made a new start to cross the Ninnis Glacier on December 3, changing course to E. 30° N., in great wonderment as to what lay ahead. In this new land interest never flagged. One never could foresee what the morrow would bring forth.

Across rolling "downs" of soft, billowy snow we floundered for twenty-four miles, on the two following days. Not a wind-ripple could be seen. We were evidently in a region of comparative calms, which was a remarkable thing, considering that the windiest spot in the world was less than two hundred miles away.

After several sunny days McLean and I had very badly cracked lips. It had been often remarked at the Hut that the standard of humour greatly depreciated during the winter and this caused McLean and me many a physical pang while

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sledging, as we would laugh at the least provocation and open all the cracks in our lips. Eating hard plasmon biscuits was a painful pleasure. Correll, who was immune from this affliction, tanned to the rich hue of the "nut-brown maiden."

On December 5, at the top of a rise, we were suddenly confronted with a new vision—"Thalassa!" was our cry, "the sea!" but a very different sea from that which brought such joy to the hearts of the wandering Greeks. Unfolded to the horizon was a plain of pack-ice, thickly studded with bergs and intersected by black leads of open water. In the north-east was a patch of open sea and above 'it, round to the north, lowering banks of steel-blue cloud. We had come to the eastern side of Ninnis Glacier.

At this point any analogy which could possibly have been found with Wilkes's coastline ceased. It seems probable that he charted as land the limits of the pack-ice in 1840.

The excitement of exploring this new realm was to be deferred. Even as we raised the tent, the wind commenced to whistle and the air became surcharged with snow. Three skua gulls squatted a few yards away, squawking at our approach, and a few snow petrels sailed by in the gathering blizzard.

Through the 6th, 7th and 8th and most of the 9th it raged, during which time we came definitely to the conclusion that as social entertainers we were complete failures. We exhausted all the reserve topics of conversation, discussed our Universities, sports, friends and homes. We each described the scenery we liked best; notable always for the sunny weather and perfect calm. McLean sailed again in Sydney Harbour, Correll cycled and ran his races, I wandered in the South Australian hills or rowed in the "eights," while the snow swished round the tent and the wind roared over the wastes of ice.

Avoiding a few crevasses on the drop to sea-level on December 10, the sledge was manœuvred over a tide-crack between glacier and sea-ice. The latter was traversed by

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frequent pressure-ridges ; hummocks and broken pinnacles being numerous.

The next six days out on the broken sea-ice were full of incident. The weather was gloriously sunny till the 13th, during which time the sledge had to be dragged through a forest of pinnacles and over areas of soft, sticky slush which made the runners execrable for hours. Ponds of open water, by which basked a few Weddell seals, became a familiar sight. We tried to maintain a south-easterly course for the coast, but miles were wasted in the tortuous maze of ice—" a wildering Theban ruin of hummock and serrac."

The sledge-meter broke down and gave the ingenious Correll a proposition which he ably solved. McLean and I had a chronic weakness of the eyes from the continual glare. Looking at the other two fellows with their long [protruding goggles made me think of Banquo's ghost : " Thou hast no speculation in those eyes that thou dost glare with."

I had noticed that some of the tide-cracks had opened widely and, when a blizzard blew on December 13, the thought was a skeleton in my brain cupboard.

On the 15th an Emperor penguin was seen sunning himself by a pool of water, so we decided to kill the bird and carry some meat in case of emergency. McLean found the stomach full of fish and myriads of cestodes in the intestines.

By dint of hard toil over cracks, ridges and jagged, broken blocks, we came, by diverging to the south-west, to the junction between shifting pack and fast bay-ice, and even there, we afterwards shuddered to find, it was at least forty-five miles, as the penguin skis, to the land.

It was a fine flat surface on which the sledge ran, and the miles commenced to fly by, comparatively speaking. Except for an occasional deep rift, whose bottom plumbed to the sea-water, the going was excellent. Each day the broken ice on our left receded, the mainland to the south grew closer and traces of rock became discernible on the low, fractured cliffs.

On December 17 a huge rocky bluff—Horn Bluff—stood



King George V Land

McLean

THE "ORGAN-PIPES" OF HORN BLUFF (1000 FEET IN HEIGHT) PUSHING OUT FROM THE MAINLAND



King George V Land

McLean

MADIGAN, CORRELL AND McLEAN CAMPED BELOW THE CLIFFS OF HORN BLUFF (1000 FEET IN HEIGHT). COLUMNAR DOLERITE IS SEEN SURMOUNTING A SEDIMENTARY SERIES PARTLY BURIED IN THE TALUS-SLOPE

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out from the shore. It had a ram-shaped bow like a Dreadnought battleship and, adjoining it, there were smaller outcrops of rock on the seaward ice-cliffs. On its eastern side was a wide bay with a well-defined cape—Cape Freshfield—at the eastern extremity about thirty miles away.

The Bluff was a place worth exploring. At a distance of more than fifteen miles, the spot suggested all kinds of possibilities, and in council we argued that it was useless to go much farther east, as to touch at the land would mean a detour on the homeward track and time would have to be allowed for that.

At a point two hundred and seventy miles from the Hut, in latitude $68^{\circ} 18' S.$, longitude $150^{\circ} 12' E.$, we erected our "farthest east" camp on December 18, after a day's tramp of eighteen miles. Here, magnetic "dips" and other observations were made throughout the morning of the 19th. It was densely overcast, with sago snow falling, but by 3 P.M. of the same day the clouds had magically cleared and the first stage of the homeward journey had commenced.

CHAPTER XVI

HORN BLUFF AND PENGUIN POINT

By C. T. MADIGAN

What thrill of grandeur ours
When first we viewed the column'd fell !
What idle, liting verse can tell
Of giant fluted towers,
O'er-canopied with immemorial snow
And riven by a glacier's azure flow ?

AS we neared Horn Bluff, on the first stage of our homeward march, the upper layers of snow were observed to disappear, and the underlying ice became thinner; in corrugated sapphire plains with blue reaches of sparkling water. Cracks bridged with flimsy snow continually let one through into the water. McLean and I both soaked our feet and once I was immersed to the thighs, having to stop and put on dry socks and finnesko. It was a chilly process allowing the trousers to dry on me.

The mountain, pushing out as a great promontory from the coast amid the fast sea-ice, towered up higher as our sledge approached its foot. A great shadow was cast on the ice, and, when more than a mile away, we left the warm sunshine.

Awed and amazed, we beheld the lone vastness of it all and were mute. Rising out of the flat wilderness over which we had travelled was a mammoth vertical barrier of rock rearing its head to the skies above. The whole face for five miles was one magnificent series of organ-pipes. The deep shade was heightened by the icy glare beyond it.

HORN BLUFF AND PENGUIN POINT

Here was indeed a Cathedral of Nature, where the "still, small voice" spoke amid an ineffable calm.

Far up the face of the cliff snow petrels fluttered like white butterflies. It was stirring to think that these majestic heights had gazed out across the wastes of snow and ice for countless ages, and never before had the voices of human beings echoed in the great stillness nor human eyes surveyed the wondrous scene.

From the base of the organ-pipes sloped a mass of debris; broken blocks of rock of every size tumbling steeply to the splintered hummocks of the sea-ice.

Standing out from the top of this talus-slope were several white "beacons," up to which we scrambled when the tent was pitched. This was a tedious task as the stones were ready to slide down at the least touch, and often we were carried down several yards by a general movement. Wearing soft finnesko, we ran the risk of getting a crushed foot among the large boulders. Amongst the rubble were beds of clay, and streams of thaw-water trickled down to the surface of a frozen lake.

After rising two hundred feet, we stood beneath the beacons which loomed above to a height of one hundred and twenty-eight feet. The organ-pipes were basaltic* in character but, to my great joy, I found the beacons were of sedimentary rock. After a casual examination, the details were left till the morrow.

That night we had a small celebration on raisins, chocolate and apple-rings, besides the ordinary fare of hoosh, biscuit and cocoa. Several times we were awakened by the crash of falling stones. Snow petrels had been seen coming home to their nests in the beacons, which were weathered out into small caves and crannies. From the camp we could hear their harsh cries.

The scene in the morning sun was a brilliant one. The great columnar rampart ran almost north and south and the

* To be exact the igneous rock was a very thick sill of dolerite.

THE HOME OF THE BLIZZARD

tent was on its eastern side. So what was in dark shadow on the day before was now radiantly illumined.

Correll remained behind on the sea-ice with a theodolite to take heights of the various strata. McLean and I, armed with aneroid, glasses, rüch-sack, geological hammer (ice-axe) and camera, set out for the foot of the talus-slope.

The beacons were found to be part of a horizontal, stratified series of sandstones underlying the igneous rock. There were bands of coarse gravel and fine examples of stream-bedding interspersed with seams of carbonaceous shale and poor coal. Among the debris were several pieces of sandstone marked by black, fossilized plant-remains. The summits of the beacons were platforms of very hard rock, baked by the volcanic overflow. The columns, roughly hexagonal and weathered to a dull-red, stood above in sheer perpendicular lines of six hundred and sixty feet in altitude.

After taking a dozen photographs of geological and general interest and stuffing the sack and our pockets with specimens, we picked a track down the shelving talus to a lake of fresh water which was covered with a superficial crust of ice beneath which the water ran. The surface was easily broken and we fetched the aluminium cover of the cooker, filling it with three gallons of water, thus saving kerosene for almost a day.

After McLean had collected samples of soil, lichens, algæ and moss, and all the treasures had been labelled, we lunched and harnessed-up once more for the homeward trail.

For four miles we ran parallel to the one-thousand-foot wall of Horn Bluff meeting several boulders stranded on the ice, as well as the fragile shell of a tiny sea-urchin. The promontory was domed with snow and ice, more than one thousand two hundred feet above sea-level. From it streamed a blue glacier overflowing through a rift in the face. Five miles on our way, the sledge passed from frictionless ice to rippled snow and with a march of seven miles, following lunch, we pitched camp.



King George V Land

McLean

AN OUTCROP OF A SEDIMENTARY FORMATION CONTAINING BANDS
OF COAL PROJECTING THROUGH THE TALUS SLOPE BELOW THE
COLUMNAR DOLERITE AT HORN BLUFF



King George V Land

THE FACE OF A GRANITE OUTCROP NEAR PENGUIN POINT. AT ITS
BASE IS A TIDE CRACK AND ICE FOOT

McLean

HORN BLUFF AND PENGUIN POINT

Every one was tired that night, and our prayer to the Sleep Merchant in the book of Australian verse was for :

Twenty gallons of balmy sleep,
Dreamless, and deep, and mild,
Of the excellent brand you used to keep
When I was a little child.

For three days, December 22, 23 and 24, the wind soughed at thirty miles per hour and the sky was a compact nimbus, unveiling the sun at rare moments. Through a mist of snow we steered on a north-west course towards the one-hundred-and-fifty-two mile depot. The wind was from the south-east true, and this information, with hints from the sun-compass, gave us the direction. With the sail set, on a flat surface, among ghostly bergs and over narrow leads we ran for forty-seven miles with scarce a clear view of what lay around. The bergs had long ramps of snow leading close up to their summits on the windward side and in many cases the intervals between these ramps and the bergs were occupied by deep moats.

One day we were making four knots an hour under all canvas through thick drift. Suddenly, after a gradual ascent, I was on the edge of a moat, thirty feet deep. I shouted to the others and, just in time, the sledge was slewed round on the very brink.

We pushed on blindly :

The toil of it none may share ;
By yourself must the way be won
Through fervid or frozen air
Till the overland journey's done.

Christmas Day ! The day that ever reminds one of the sweet story of old, the lessons of childhood, the joys of Santa Claus—the day on which the thoughts of the wildest wanderer turn to home and peace and love. All the world was cheerful ; the sun was bright, the air was calm. It was the home-trail, provisions were in plenty, the sledge was light and our hearts lighter.

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The eastern edge of Ninnis Glacier was near, and, leaving the sea-ice, we were soon straining up the first slope, backed by a line of ridges trending north-east and south-west, with shallow valleys intervening. On the wind-swept crests there were a few crevasses well packed with snow.

It was a day's work of twelve miles and we felt ready for Christmas dinner. McLean was cook and had put some apple-rings to soak in the cooker after the boil-up at lunch. Beyond this and the fact that he took some penguin-meat into the tent, he kept his plans in the deepest mystery. Correll and I were kept outside making things snug and taking the meteorological observations, until the word came to enter. When at last we scrambled in, a delicious smell diffused through the tent, and there was a sound of frying inside the cooker-pot. We were presented with a menu which read :

“Peace on earth, good will to men.”

Xmas 1912

KING GEORGE V. LAND
200 miles east of Winter Quarters.

MENU DU DINER

Hors d'œuvre

Biscuit de plasmon Ration du lard glacé

Entrée

Monsieur l'Empereur Pingouin fricassé

Pièce de Résistance

Pemmican naturel à l'Antarctique

Dessert

Hotch-potch de pommes et de raisins

Chocolat au sucre glaxonné

Liqueur bien ancienne de l'Ecosse

Cigarettes Tabac

The *hors d'œuvre* of bacon ration was a welcome surprise. McLean had carried the tin unknown to us up till this moment. The penguin, fried in lumps of fat taken from the pemmican, and a little butter, was delicious. In the same pot the hoosh was boiled and for once we noted an added piquancy. Next followed the plum-pudding—a dense mixture of powdered biscuit, glaxo, sugar, raisins and

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apple-rings, surpassing the finest, flaming, holly-decked, Christmas creation.

Then came the toasts. McLean produced the whisky from the medical kit and served it out, much diluted, in three mugs. There was not three ounces in all, but it flavoured the water.

I was asked to call "The King." McLean proposed "The Other Sledgers" in a noble speech, wishing them every success; and then there were a few drops left to drink to "Ourselves," whom Correll eulogized to our complete satisfaction. We then drew on the meagre supply of cigarettes and lay on our bags, feeling as comfortable as the daintiest epicure after a twelve-course dinner, drinking his coffee and smoking his cigar.

We talked till twelve o'clock, and then went outside to look at the midnight sun, shining brightly just above the southern horizon. Turning in, we were once more at home in our dreams.

By a latitude shot at noon on Boxing Day, I found that our position was not as far north as expected. The following wind had been probably slightly east of south-east and too much westing had been made. From a tangle of broken ridges whose surface was often granular, half-consolidated ice, the end of the day opened up a lilac plain of sea-ice ahead. We were once more on the western side of Ninnis Glacier and the familiar coast of Penguin Point, partly hidden by an iceberg, sprang into view. The depot hill to the north-west could be recognized, twenty miles away, across a wide bay. By hoosh-time we had found a secure path to the sea-ice, one hundred and eighty feet below.

The wind sprang up opportunely on the morning of the 27th, and the sun was serene in a blue sky. Up went the sail and with a feather-weight load we strode off for the depot eighteen miles distant. Three wide rifts in the sea-ice exercised our ingenuity during the day's march, but by the time the sun was in the south-west the sledge was sawing through the sandy snow of the depot hill. It was unfortunate that

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the food of this depot had been cached so far out of our westerly course, as the time expended in recovering it might have been profitably given to a survey of the mainland east of Penguin Point. At 6.20 P.M., after eighteen and a quarter miles, the food-bag was sighted on the mound, and that night the dinner at our one-hundred-and-fifty-two-mile depot was marked by some special innovations.

Penguin Point, thirty miles away, bore W. 15° S., and next day we made a bid for it by a march of sixteen miles. There was eleven days' ration on the sledge to take us to Mount Murchison, ninety miles away; consequently the circuitous route to the land was held to be a safe "proposition."

Many rock faces became visible, and I was able to fix numerous prominent points with the theodolite.

At three miles off the coast, the surface became broken by ridges, small bergs and high, narrow cupolas of ice surrounded by deep moats. One of these was very striking. It rose out of a wind-raked hollow to a height of fifty feet; just the shape of an ancient Athenian helmet. McLean took a photograph.

As at Horn Bluff, the ice became thinner and freer of snow as we drew near the Point. The rocky wall under which the tent was raised proved to be three hundred feet high, jutting out from beneath the slopes of ice. From here the coast ran almost south on one side and north-west on the other. On either hand there were dark faces corniced with snow.

The next day was devoted to exploration. Adelie penguins waddled about the tide-crack over which we crossed to examine the rock, which was of coarse-grained granite, presenting great, vertical faces. Hundreds of snow petrels flew about and some stray skua gulls were seen.

Near the camp, on thick ice, were several large blocks of granite which had floated out from the shore and lay each in its pool of thaw-water, covered with serpulæ and lace coral.

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Correll, our Izaak Walton, had brought a fishing-line and some penguin-meat. He stopped near the camp fishing while McLean and I continued down the coast, examining the outcrops. The type of granite remained unchanged in the numerous exposures.

I had noticed a continuous rustling sound for some time and found at length that it was caused by little streams of ice-crystals running down the steep slopes in cascades, finally pouring out in piles on the sea-ice. The partial thaw in the sunlight causes the semi-solid ice to break up into separate grains. Sometimes whole areas of the surface, in delicate equilibrium, would suddenly flow rapidly away.

For three miles we walked, and as the next four miles of visible coast presented no extensive outcrops, we turned back for lunch.

During the afternoon, on the summit of the Point, it was found that an uneven rocky area, about a quarter of a mile wide, ran backwards to the ice-falls of the plateau. The surface was very broken and weathered, covered in patches by abundant lichens and mosses. Fossicking round in the gravel, Correll happened on some tiny insect-like mites living amongst the moss or on the moist under side of slabs of stone. This set us all insect-hunting. Alcohol was brought in a small bottle from the tent, and into this they were swept in myriads with a camel's-hair brush. From the vantage-point of a high rock in the neighbourhood the long tongue of Mertz Glacier could be seen running away to the north.

At 8.30 A.M., on New Year's Eve, we set off for another line of rocks about four miles away to the west. There were two masses forming an angle in the ice-front and consisting of two main ridges rising to a height of two hundred and fifty feet, running back into the ice-cap for a mile, and divided by a small glacier.

This region was soon found to be a perfect menagerie of life. Seals lay about dozing peacefully by the narrow lanes of water. Adelie penguins strutted in procession up

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and down the little glacier. To reach his rookery, a penguin would leap four feet on to a ledge of the ice-foot, painfully pad up the glassy slope and then awkwardly scale the rocks until he came to a level of one hundred and fifty feet. Here he took over the care of a chick or an egg, while the other bird went to fish. Skua gulls flew about, continually molesting the rookeries. One area of the rocks was covered by a luxuriant growth of green moss covering guano and littered skeletons—the site of a deserted rookery.

Correll and I went up to where the ridges converged, selecting numerous specimens of rock and mineral and finding thousands of small red mites in the moist gravel. Down on the southern ridge we happened on a Wilson petrel with feathered nestlings. At this point McLean came along from the west with the news of silver-grey petrels and Cape pigeons nesting in hundreds. He had secured two of each species and several eggs. This was indeed a discovery, as the eggs of the former birds had never before been found. Quite close to us were many snow petrels in all kinds of unexpected crevices. The light was too dull for photographing, but, while I took magnetic “dips” on the following morning, McLean visited the silver-grey petrels and Cape pigeons and secured a few “snaps.”

The last thing we did before leaving the mainland was to kill two penguins and cut off their breasts and this meat was, later, to serve us in good stead.

Crossing the Mertz Glacier at any time would have been an unpleasant undertaking, but to go straight to Mount Murchison (the site of our first depot on the outward journey) from Penguin Point meant spanning it in a long oblique line. It was preferable to travel quickly and safely over the sea-ice on a north-westerly course, which, plotted on the chart, intersected our old one-hundred-mile camp on the eastern margin of the glacier; then to cross by the route we already knew.

By January 2 we had thrown Penguin Point five miles behind, and a spell of unsettled weather commenced; in

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front lay a stretch of fourteen miles over a good surface. The wind was behind us, blowing between thirty and forty miles per hour, and from an overcast sky light snow was falling. Fortunately there were fleeting glimpses of the sun, by which the course could be adjusted. Towards evening the snow had thickened, but thanks to the splendid assistance afforded by a sail, the white jutting spurs of the edge of Mertz Glacier were dimly visible.

A blizzard took possession of the next day till 7 P.M., when we all sallied out and found the identical gully in which was the one-hundred-mile camp of the outward journey. The light was still bad and the sky overcast, so the start was postponed till next morning.

There was food for five days on a slightly reduced ration and the depot on Mount Murchison was forty miles away.

Once we had left the sea-ice and stood on the glacier, Aurora Peak with its black crest showed through the glasses. Once there, the crevasses we most dreaded would be over and the depot easily found.

A good fourteen and a quarter miles slipped by on January 4—a fine day. On January 5 the “plot began to thicken.” The clouds hung above like a blanket, sprinkling light snow. The light was atrocious, and a few open rents gave warning of the western zone of pitfalls. All the while there was a shifting spectral chaos of whiteness which seemed to benumb the faculties and destroy one’s sense of reality. We decided to wait for a change in the weather.

During the night the snow ceased, and by lunch time on the 6th the sledge-meter recorded ten miles. The strange thing was that the firm sastrugi present on the outward journey were now covered inches in snow, which became deeper as we marched westward.

It was now a frequent occurrence for one of us to pitch forward with his feet down a hidden crevasse, sometimes going through to the waist. The travelling was most nerve-racking. When a foot went through the crust of snow, it was impossible to tell on which side of the crevasse one happened

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to be, or in what direction it ran. The only thing to do was to go ahead and trust in Providence.

At last we landed the sledge on a narrow ridge of hard snow, surrounded by blue, gaping pits in a pallid eternity of white. It was only when the tent was pitched that a wide quarry was noticed a few yards away from the door.

It was now fourteen miles to the top of Mount Murchison and we had only two more days' rations and one and a half pounds of penguin-meat.

On January 7th the light was worse than ever and snow fell. It was only six miles across the broken country between us and the gully between Mt. Murchison and Aurora Peak, where one could travel with some surety. A sharp look-out was kept, and towards 11 P.M. a rim of clear sky overtopped the southern horizon. We knew the sun would curve round into it at midnight, so all was made ready for marching.

When the sun's disc emerged into the rift there was light; but dim, cold and fleeting. The smallest irregularity on the surface threw a shadow hundreds of yards long. The plain around was a bluish-grey checquer-board of light and shade; ahead, sharp and clear against the leaden sky, stood beautiful Aurora Peak, swathed in lustrous gold—the chariot of the goddess herself. The awful splendour of the scene tended to depress one and make the task more trying. I have never felt more nervous than I did in that ghostly light in the tense silence, surrounded by the hidden horror of fathomless depths. All was covered with a uniform layer of snow, growing deeper and heavier at every step. I was ahead and went through eight times in about four miles. The danger lay in getting the sledge and one, two, or all of us on a weak snow-bridge at the same time. As long as the sledge did not go down we were comparatively safe.

At 1.30 A.M. the sun was obscured and the light waned to dead white. Still we went on, as the entrance of the gully between Aurora Peak and Mount Murchison was near at hand and we had a mind to get over the danger-zone before a snowstorm commenced.



King George V Land

THE GRANITE CLIFFS AT PENGUIN POINT WHERE CAPE PIGEON AND SILVER-PETREL
ROOKERIES WERE FOUND; THE SITE OF NEW YEAR'S CAMP

McLean

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By 5.30 A.M. we breathed freely on "terra firma," even though one sunk through a foot of snow to feel it. It had taken six hours to do the last five and three-quarter miles, and, being tired out with the strain on muscles and nerves, we raised the tent, had a meal, and then slept till noon on the 8th. It was eight miles to the depot, five miles up the gully and three miles to the summit of Mount Murchison; and no one doubted for a moment that it could not be done in a single day's march.

Advancing up the gully after lunch, we found that the surface became softer, and we were soon sinking to the knees at every step. The runners, too, sank till the decking rested on the snow, and it was as much as we could do to shift the sledge, with a series of jerks at every step. At 6 P.M. matters became desperate. We resolved to make a depot of everything unnecessary, and to relay it up the mountain afterwards.

The sledge-meter, clogged with snow and almost submerged, was taken off and stood up on end to mark a depot, whilst a pile was made of the dip-circle, theodolite and tripod, pick, alpine rope, ice-axe, all the mineral and biological specimens and excess clothing.

Even thus lightened, we could scarcely move the sledge, struggling on, sinking to the thighs in the flocculent deluge. Snow now began to fall so thickly that it was impossible to see ahead.

At 7 P.M. we finished up the last scraps of pemmican and cocoa. Biscuit, sugar and glaxo had given out at the noon meal. There still remained one and a half pounds of penguin-meat, several infusions of tea and plenty of kerosene for the primus.

We staggered on till 10.30 P.M., when the weather became so dense that the sides of the gully were invisible. Tired out, we camped and had some tea. In eight hours we had only made four and a half miles, and there was still the worst part to come.

In our exhausted state we slept till 11 P.M. of January 9,

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awaking to find the sky densely overcast and a light fog in the air. During a rift which opened for a few minutes there was a short glimpse of the rock on Aurora Peak. Shredding half the penguin-meat, we boiled it up and found the stew and broth excellent.

At 1.30 A.M. we started to struggle up the gully once more, wading along in a most helpless fashion, with breathing spells every ten yards or less. Snow began to fall in such volume that at last it was impossible to keep our direction with any certainty. The only thing to do was to throw up the tent as a shelter and wait. This we did till 4.30 A.M.; but there must have been a cloud-burst, for the heavy flakes toppled on to the tent like tropical rain. We got into sleeping-bags, and tried to be patient and to forget that we were hungry.

Apparently, during our seven weeks' absence, the local precipitation had been almost continual, and snow now lay over this region in stupendous amount. Even when one sank three feet, it was not on to the firm sastrugi over which we had travelled out of the valley on the outward journey, for these lay still deeper. It was hoped that the "snow-dump" did not continue over the fifty miles to the Hut, but we argued that on the windy pleatau this could scarcely be possible.

It was evident that without any more food, through this bottomless, yielding snow, we could never haul the sledge up to the depot, a rise of one thousand two hundred feet in three miles. One of us must go up and bring food back, and I decided to do so as soon as the weather cleared.

We found the wait for clearer weather long and trying with empty stomachs. As the tobacco-supply still held out, McLean and I found great solace in our pipes. All through the rest of the day and till 5 P.M. of the next, January 10, there was not a rift in the opaque wall of flakes. Then to our intense relief the snow stopped, the clouds rolled to the north, and, in swift transformation—a cloudless sky with bright sunshine! With the rest of the penguin-meat—a

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bare half-pound—we had another thin broth. Somewhat fortified, I took the food-bag and shovel, and left the tent at 5.30 A.M.

Often sinking to the thighs, I felt faint at the first exertion. The tent scarcely seemed to recede as I toiled onwards towards the first steep slope. The heavy mantle of snow had so altered the contours of the side of the gully that I was not sure of the direction of the top of the mountain.

Resting every hundred yards, I floundered on hour after hour, until, on arriving at a high point, I saw a little shining mound standing up on a higher point, a good mile to the east. After seven hours' wading I reached it and found that it was the depot.

Two feet of the original eight-foot mound projected above the surface, with the bamboo pole and a wire-and-canvas flag rising another eighteen inches. On this, a high isolated mountain summit, six feet of snow had actually accumulated. How thankful I was that I had brought a shovel!

At seven feet I "bottomed" on the hard snow, without result. Then, running a tunnel in the most probable direction, I struck with the shovel the kerosene tin which was on the top of the food-bag. On opening the bag, the first items to appear were sugar, butter and biscuits; the next quarter of an hour I shall not forget!

I made a swag of five days' provisions, and, taking a direct route, attacked the three miles downhill in lengths of one hundred and fifty yards. Coming in sight of the tent, I called to my companions to thaw some water for a drink. So slow was progress that I could speak to them a quarter of an hour before reaching the tent. I had been away eleven and a half hours, covering about seven miles in all.

McLean and Correll were getting anxious about me. They said that they had felt the cold and were unable to sleep. Soon I had produced the pemmican and biscuit, and a scalding hoosh was made. The other two had had only a mug of penguin broth each in three days, and I had only broken my fast a few hours before them.

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After the meal, McLean and Correll started back to the cache, two miles down the gully, to select some of the geological and biological specimens and to fetch a few articles of clothing. The instruments, the greater part of the collection of rocks, crampons, sledge-meter and other odds and ends were all left behind. Coming back with the loads slung like swags they found that by walking in their old footsteps they made fair progress.

By 8 P.M. all had rested, every unnecessary fitting had been stripped off the sledge and the climb to the depot commenced. I went ahead in my old trail, Correll also making use of it; while McLean broke a track for himself. The work was slow and heavy; nearly six hours were spent doing those three miles.

It was a lovely evening; the yellow sun drifting through orange cloudlets behind Aurora Peak. We were in a more appreciative mood than on the last midnight march, exulting in the knowledge of ten days' provisions at hand and fifty-three miles to go to reach the Hut.

In the manner of the climate, a few wisps of misty rack came sailing from the south-east, the wind rose, snow commenced to fall and a blizzard held sway for almost three days. It was just as well that we had found that depot when we did.

The fifty-three miles to the Hut melted away in the pleasures of anticipation. The first two miles, on the morning of January 14, gave us some strenuous work, but they were luxurious in comparison with what we expected; soon, however, the surface rapidly and permanently improved. A forty-mile wind from the south-east was a distinct help, and by the end of the day we had come in sight of the nunatak first seen after leaving the Hut (Madigan Nunatak).

In two days forty miles lay behind. Down the blue ice-slopes in slippery finnesko, and Aladdin's Cave hove in sight. We tumbled in, to be assailed by a wonderful odour which brought back orchards, shops, people—a breath of civilization. In the centre of the floor was a pile of oranges

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surmounted by two luscious pineapples. The Ship was in ! There was a bundle of letters—Bage was back from the south—Wild had been landed one thousand five hundred miles to the west—Amundsen had reached the Pole ! Scott was remaining in the Antarctic for another year. How we shouted and read all together !

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